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Initialled abstracts and reviews not by Bureau staff are by R. J. Garner, A. H. M. Kirby and D. H. Maggs of the East Malling Research Station, and by J. R. Llewelyn.

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SALIENT ITEMS, Vol. 28, No. 2.

ENVIRONMENT

General:—The proceedings of a meeting held at Nottingham University in 1957 to discuss "control of the plant environment" have now been published (2005).

Soils and their management:—The management of grass cover crops in orchards affects the extent to which they compete with trees for magnesium as well as water (1120, 1122). Flower growers receive special consideration in papers on peat, sewage sludge and leaf moulds (1680–1682).

Soil moisture, aeration and drought:—With some vegetables there may be seasonal differences in the amount of aeration needed by their roots (1374). Several concepts on the nature of drought resistance and the permanent wilting percentage are under fire (1066, 1550, 1936–1938). Where drought does occur, the wilting of plants can be delayed by spraying them with organic silicone solutions (1080).

Light:—Light intensity affects net assimilation rates in tea (1968, 1969), root growth in maples (1759, 1760) and latex formation in rubber trees (1920). Light wavelength has an effect on photoperiodic responses (1679, 1710) and on the accumulation of essential oils in certain plants (1633). Attempts to interpret the interactions of red and far-red light, however, leave the writer pretty well in the dark (1032, 1490). Of more practical interest are further papers on the photoperiodic control of flowering in chrysanthemums (1697–1699), information on the effects on plant temperature and growth of different types of lamp (1372, 1716) and an account of the use of fluorescent lights which move constantly to and fro over the plants (1371).

Temperature:—Various effects of temperature on dormancy, growth and respiration are reported for deciduous fruits (1110), vines (1186, 1189) and coffee (1875). In biennial vegetables vernalization increases the total content of sugars (1474). In radishes temperature affects seed formation (1482), and in morning glory it may alter leaf shape (1705).

GROWTH PHENOMENA

Growth characteristics:—For apples correlations have been established between leaf and fruit characters and between growth measurements and yield (1091, 1107). With plums it has been found that suckers develop from special roots, which, perhaps significantly, arise from the bole of the tree (1104). For tobacco methods used in detailed studies of root systems are described (1556).

Pruning and training:—The physiology of pruning and of plagiotropic shoots is examined in two papers on apples (1138, 1140). With vines severe pruning may alter the sexual characteristics of the flowers (1200). The healing of pruning wounds is hastened by 2,4-D plus zinc oxide (1139).

Hardiness:—Fruit species indigenous to the far north have a relatively short dormancy requirement and thus are subject to frost injury when grown in variable winter conditions farther south (1111). Frost hardiness has been correlated with cell sap concentration (1030) and starch accumulation (1224). Autumn, but not winter, applications of nitrogen may increase the frost susceptibility of apples (1127).

Growth promotion:—Gibberellins continue to lead the field (1049–1053, 1081p, 1082c, l, r, 1112, 1113, 1440–1442, 1703, 1707, 1755). Possible rivals are an aloe extract (1415), penicillin (1519) and esculin (1805). Ribonucleic acid, which affects nitrogen metabolism, also stimulates growth (1147, 1571).

Growth inhibition:—Maleic hydrazide figures as a defoliant as well as a growth inhibitor (1180, 1754, 1775). Among other substances that have suppressed growth are nicotine (1054) and kinetin (1370).

Other aspects of growth regulation:—A complex mixture called Rindite can be used to break dormancy in trees (1037). In the abscission of flowers methionine appears to play a leading part (1573). Growth substance sprays can be used to thin pecans (1211), produce larger grapes (1204, 1205), or increase tomato crops (1511), but their use on prunes would seem to be risky (1145). Teetotallers may care to note that alcohol can be used to increase fruit size in tomatoes (1510) and to hasten ripening in persimmons (1838).

MACHINERY, MATERIALS AND METHODS

Mechanized harvesting:—Bulk handling, now in fairly common use for apples in some countries (1155), has been applied to peaches (1156). New harvesting machines are available to tempt the growers of vegetables (1390, 1395, 1456) and sugar cane (1955, 1956). Tobacco growers with less than 10 acres should, however, avoid the temptation (1593).

Other machines:—Growers who still have any money left can obtain digging machines and hydraulic borers (1074, 1075), a weed crushing roller (1352), pruning machines (1792), and a spraying machine which might be said to rival a fire engine (1307). Are your men tired? If so, provide them with a field-transit machine, on which they can work lying down (1073).

Apparatus and techniques:—Gadgets are available for controlling day length automatically (1081o), for simulating rain (1316h), for collecting hevea latex under aseptic conditions (1927) and for measuring fruit firmness (1534) and leaf temperatures (1598). New ways have been found to measure the evaporation loss from sprinklers (1064) and the size of stomata (1079) and to make imprints of radioactive leaves (1019) and of spray deposits (1311).

Greenhouses:—A description of a new plastic greenhouse (1068) is followed by information on improved methods of heating (1069–1071) and cooling (1678).

Packing and storing:—Box liners are recommended for apples, pears and grapes (1157, 1167, 1208). Methods of precooling and cooling produce are considered in three papers (1076, 1158, 1181) and of storing apples in three others (1163, 1165, 1166). Gamma irradiation may affect the respiration rates of apples and tomatoes, but just what good this does seems uncertain (1159, 1529). New methods of packing and preserving cut flowers are also described (1684, 1752, 1776).

NUTRITION

Surveys:—A general picture of the response of crops to fertilizers can be obtained by examining the results of large numbers of widely-scattered trials. Examples of this type of survey concern sugar cane (1939, 1940, 1943) and rubber (1917). Similarly, a leaf-analysis survey of high-yielding citrus orchards has provided more accurate guidance on the minimum requirements of certain elements (1803).

Analyses:—Precise recommendations are made on when, where and how to collect coffee leaves for analysis (1873). New procedures are available for determining the organic or inorganic constituents of these or other leaf samples (1018, 1060–1062, 1081v, w, y, 1082j, m, n, x).

Macro-nutrients:—For tomatoes foliar nutrition, with and without the aid of some novel spreaders, can be as efficient as soil nutrition (1517). The excretion as well as the absorption of nutrients by roots is shown to proceed rhythmically (1031) and to be governed by the accumulation of organic acids (1058). Among papers on N are two on its effects on soil Ca in shaded and unshaded tea (1972, 1973), one on its role in the competition between shade trees and coffee (1871), and another on the fixation of atmospheric N by non-leguminous plants possessing root nodules (1059). Papers on P include accounts of its absorption as affected by growth phase and by soil temperature (1132, 1516), and of its use, as superphosphate, to counteract ammonia toxicity resulting from heavy dressings of calcium cyanamide (1554). K and Mg, normally antagonistic in vegetative organs, may be found in positive association in apple fruits (1131); both, when present in excess, may cause Ca deficiency (1378).

Micro-nutrients:—Applications of N and P may alter the concentrations of several trace elements in avocado leaves (1788, 1789). Boron is prominent in further studies on the translocation of sugars (1022, 1521) and in disorders of wattles and tea (1667, 1977).

Uninvited nutrients:—A review lists 174 references on the uptake and accumulation of radioactive fission products (1082t). This number can now be increased by six papers from Russia describing fundamental research on the subject (1038–1043) and by one from the U.S.A. bearing the optimistic title "Defense against radioactive fallout on the farm" (1082q).

PLANT PROTECTION

General:—A new book in the "Advances" series covers a wide field of research on the control of diseases and pests (2009).

Fungi and bacteria:—Coffee seedlings required for disease studies can be grown on sterile agar (1878). Investigations on disease susceptibility as affected by plant nutrition are reported for cabbage and rubber (1402, 1921). New chemicals of possible interest include a mixture of uranium acetate and gramicidin against apple scab (1245) and stannic triphenylacetate against celery leaf spot (1387). An old stager at present receiving close attention is bordeaux mixture (1316i, 1523).

Viruses:—Included are a staining technique for detection (1945), a virus inhibitor in carnations (1694) and more information on heat inactivation (1235, 1582, 1769, 1810).

Nematodes:—Root-lesion nematodes are among the factors causing the peach replant problem in Ontario (1258, 1259). In bananas a moderate attack by the burrowing nematode is apt to produce more dramatic symptoms than does a severe attack (1854). The same species can be greatly reduced among living citrus trees by treating the soil with hydrogenated fish oil (1814).

Insects and mites:—Baits and traps for various fruit flies continue to multiply (1281, 1282, 1424, 1884). A polyhedrosis virus spray appears promising against the cabbage looper (1494). Among the newer acaricides Tedion has no insecticidal action and negligible toxicity to mammals (1302, 1303).

Animals:—In addition to review articles on crop protection against mammals and birds (1316y, 1317p), two veritable witches' brews are recommended for use in orchards against hares, etc. (1297, 1298).

Plant reactions to chemicals:—The NPK content of plants can be altered by insecticides (1451) and their transpiration rates by fungicides (1525).

Weeds:—For those who dislike chemicals there are geese to control grassy weeds (1318) and herbivorous fish to deal with aquatic plants (1327). For the chemically-minded majority there are the treatment of mulches with herbicides before they are applied to strawberries (1338), a neat bit of timing in the use of 2,4,5-T to control bayberries in blueberries (1336), methods of destroying mistletoe (1333, 1334) and a study on the use of additives to enhance herbicidal action (1326).

PROPAGATION

General:—A new book "Plant propagation in pictures" is reviewed in 2003. Heavier fare is provided by the report of a committee which has examined legislation covering transactions in seeds in the U.K. (2025).

Seed storage and germination:—When vegetable seeds are stored for long periods they may show a seasonal resurgence of vitality at the end of each winter (1383). The effect of temperature on the germination of bean seeds varies with their moisture content (1434). The germination of orchid seeds can be hastened by adding vitamins and growth substances to the rooting medium (1740).

Seed treatment:—With hot water (1447, 1448) and fungicides (1384, 1385, 1407, 1445, 1486) against diseases, and with infra-red rays against weevils (1454).

Cuttings:—Subjects dealt with include progress in mist propagation (1676, 1677) and various factors which improve rooting in woody plants (1099, 1761, 1768, 1773, 1870). Leaf-bud cuttings have been used to propagate brassicas (1400) and are being tried out for deciduous fruits (1097). In leaf cuttings of saintpaulia bud initiation has been stimulated by the application of adenine and kinetin (1709). Two other papers, though not in themselves concerned with plant propagation, may conceivably suggest new approaches to the subject (1035, 1443).

Rootstock-scion relationships:—A record in smallness is claimed for grafts of pea apices containing only about 600 cells (1439). The absence of vascular tissue in orchid graft unions indicates that parenchyma cells can serve for both upward and downward translocation (1609). A more complete picture of apple rootstock effects is now emerging from East Malling trials, which have been in progress for 35 years (1102). At the opposite extreme is an experiment in which single orange fruits were grafted and grown to maturity on lemon plants (1821). Various other aspects, some rather curious, of stock-scion relationships are discussed in 1027, 1028, 1101, 1114 and 1414.

MISCELLANEOUS

By-products:—Passion fruit rinds and seeds for cows (1835), a proteolytic enzyme from pineapple stems (1908) and a new way of preparing hecogenin from sisal leaves (1613).

Damsons:—No longer what they seem to be (1095).

Humic acid:—Present in leaves, hence not merely a decomposition product in soil (1082g).

Humidity forecasting service:—To help tobacco growers to cure their crop (1595).

Music hath:—The ability to make plants grow faster (1690).

New fruit:—Or at least new to us—the nsafu (1993).

Poisonous petals:—Insecticidal properties of common flower petals (1653).

Rat saliva:—The fastidious may be glad to hear that it is unlikely to be widely used for removing the mucilage from coffee beans (1891).

MISCELLANEOUS.

General.

(*See also* 1081d, r, 2001, 2005, 2013, 2015, 2018, 2030, 2036, 2038, 2042-2044, 2046, 2051-2053, 2056, 2058e.)

1016. Procenko, D. F., and Lypa, A. L.
The main tasks of construction of the new botanic garden of Kiev University. [Russian.]
Bjul. Gl. botan. Sada AN SSSR, 1956, No. 26, pp. 103-5, from *Ref. Ž.* (*Biol.*), 1957, No. 15, Abstr. 64,387.

The new botanical garden of 70 ha. will contain botanical, geographical, dendrological and ornamental plant sections, a fruit garden and a plant introduction nursery. On special plots medicinal, essential oil, industrial and certain other types of plants will be grown, and promising vitamin-bearing plants and those producing antibiotics and phytoncides will be studied. A laboratory with controlled climate and glasshouses for tropical and sub-tropical flora will be erected.

Statistical method.

1017. Cochran, W. G.
Analysis of covariance: its nature and uses.
Biometrics, 1957, **13**: 261-81, bibl. 22.

This is the introductory paper in a special issue of *Biometrics* devoted entirely to the analysis of covariance. Although much of this issue is technically specialized, the introductory paper describes the several uses to which covariance may be put, its computations and something of its theory, in a manner suited to non-mathematical readers.

Biochemistry.

(*See also* 1081j, l, v, w, y, 1082a, g, j, k, m-o, x, 1177, 2058h.)

1018. Greenshields, R. N.
A chromatographic method for studying simple compounds in plants.
Nature, 1958, **181**: 280-1, bibl. 2, illus.

The relatively simple method described involves expressing the sap juices of plants directly on to the chromatogram. In an example of its application french bean seedlings were cut into 13 sections, 4 consisting of cotyledons, 2 of hypocotyl and 7 of tap root, each section being placed at a marked position on the starting line of a chromatogram and its sap expressed. The method has proved applicable to studies on the distribution of saccharides, amino-acids and other simple compounds, and may also provide information on translocation and other allied problems.—Univ. Birmingham, Edgbaston.

1019. Medvedev, Ž. A.
A study of the synthesis and possible translocation of labelled proteins in the vascular system of plants by means of a new method of differentiated autoradiography of leaf imprints on filter paper. [Russian, with English summary ½ p.]
Izv. Timiryazev. seljsk. Akad., 1957, No. 3, pp. 186-206, bibl. 6, illus.
A new method for the autoradiography of plants. [Russian.]
Priroda, 1957, **46**(8): 90-2, bibl. 1, illus.

Imprints of leaves prepared on filter paper under high pressure (150-200 atm.) were used for autoradiographic determination of labelled elements. These imprints, when lixivated with trichloroacetic acid, lost their inorganic and amino acid compounds leaving only the labelled proteins and nucleic acids. Further possibilities of this method include variation of pressure whereby the imprint contains only certain fractions of the cell content of the leaf, and the use of a base consisting of a number of layers of thin but dense filter paper, in which case different fractions of the cell content penetrate into different layers of the base. By these means protein and nucleic acid syntheses were studied in bean plants supplied with S^{35}, and the distribution of S^{35} in the leaves of some vegetable and ornamental plants was observed. The second paper gives a brief popular account of the same work and notes that imprints could replace the usual herbarium specimens for botanical studies.

1020. Bottini, E., and Zavanaju, A.
La valutazione delle vitamine nei prodotti ortofrutticoli per mezzo della spettrometria nell'infrarosso. (**Determination of vitamins in vegetable and fruit products by infra-red spectrometry.**) [English summary 8 lines.]
Ann. Sper. agrar., 1957, **11**: 1233-83, bibl. 64.

Methods of extracting and determining vitamins are described. Quantitative losses of vitamins are quoted for tomatoes before and during processing and during storage of the concentrate. Other work reviewed deals with dried, cold stored and frozen fruits and vegetables and with fruit juices.

1021. Mayer, A. M.
Inhibition of ascorbic acid oxidase by thiourea.
Nature, 1957, **180**: 1417-18, bibl. 5.

From experiments on germinating lettuce seed it is concluded that thiourea strongly inhibits ascorbic acid oxidase activity *in vitro* and *in vivo*, presumably because of its copper complexing action. Full details will be published elsewhere.—Hebrew Univ., Jerusalem.

1022. Dugger, W. M., Jr., Humphreys, T. E., and Calhoun, B.
The influence of boron on starch phosphorylase and its significance in translocation of sugars in plants.
Plant Physiol., 1957, **32**: 364-70, bibl. 30.

Studies with bean leaves supplied with B and glucose suggested that B increases the translocation of sugars in plants by decreasing enzymatic conversion of glucose-1-phosphate into starch.—Univ. Fla, Gainesville.

1023. Marks, J. D., Bernlohr, R., and Varner, J. E.
Esterification of phosphate in ripening fruit.
Plant Physiol., 1957, **32**: 259-62, bibl. 7.

The occurrence of phosphate esterification has been established, by means of P^{32} tracer techniques, for intact tomato fruit during early periods in maturation (pre-climacteric), and likewise has been established during the post-climacteric period of senescence. The failure of fruit to ripen normally, when formation of high-energy phosphate esters is inhibited, either by DNP-treatment or bruising injury, further sustains the apparent requirement for oxidative phosphorylation by ripening fruit. The role of phosphorylation in fruit ripening would thus seem to point toward the existence of energy requiring syntheses, which are essential to the completion of ripening by senescing fruit. [Authors' summary.]—Ohio State Univ., Columbus.

1024. Andreeva, N. A.
The biosynthesis of folinic acid in plants. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1957, **117**: 462-5, bibl. 6, illus.

The contents of folic and folinic acids in 12 plants are given, and the biosynthesis and effects of the substances in germinating pea seeds are discussed.

1025. Bokučava, M. A., and Skobeleva, N. I.
The rôle and significance of aldehydes in the transformation of tannins at high temperatures. [Russian, with English summary 5 lines.]
Biohimija, 1957, **22**: 1004-7, bibl. 4, illus.

During the interaction of tannins with aldehydes at high temperatures a regular quantitative change took place in the catechins. With an increase in temperature this interaction was enhanced, resulting in the formation of coloured soluble and insoluble products, which may account for the black colour of dried tea.

1026. Bate-Smith, E. C., and Metcalfe, C. R.
Leuco-anthocyanins. 3. The nature and systematic distribution of tannins in dicotyledonous plants.
J. Linn. Soc. (*Bot.*), 1957, **55**: 669-705, bibl. 22.

The results of examining the stems of over 500 species from 175 families for tannins and leaves for leuco-anthocyanins are tabulated and discussed, particularly the taxonomic significance of tannin occurrence.

Physiology.

(*See also* 1081o, u, x, 1082i, p, y, 1686.)

1027. Kraevoj, S. Ja.
On the problem of inheritance of variation induced by grafting. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1957, **116**: 1022-5, bibl. 15.

Species of *Nicotiana*, varieties of tomato, cultivated and wild potato and *Datura stramonium* were used in reciprocal grafts. Examinations of the progeny for the changes in alkaloid accumulation (nicotine, atropine) produced by grafting, and also in the ability of wild potato to form tubers, have shown that these characters are not transmissible by grafting. It can therefore be considered that grafting does not cause any fundamental changes sufficient for the plants to be regarded as vegetative hybrids.

1028. Litvinenko, A. I.
The assimilation of photosynthetic products of the rootstock by the scion during intergeneric and intra-specific grafting. [Russian.]
Agrobiologija, 1957, No. 3, pp. 134-6, bibl. 11, illus.

A tomato variety and *Nicotiana rustica* were used as rootstocks and 2 tomato varieties and *Solanum nigrum* as scions. Union occurred 7–14 days after grafting. When a mature leaf of an ungrafted plant or of a rootstock was enclosed in $C^{14}O_2$ for 1·5 hrs the roots and the expanding top leaf became radioactive, but not the other leaves. The distribution of photosynthetic products in intact plants and in young grafted plants, irrespective of their components, was the same.

1029. Gorbunova, G. S.
Changes in photosynthesis and in some other physiological processes during the ontogeny of plants in relation to different environmental conditions. [Russian.]
Tr. Botan. in-ta AN SSSR, 1956, **4**(11): 165-207, bibl. 88, from abstr. in *Ref. Ž.* (*Biol.*), 1957, No. 13, abstr. 55,285.

Studies during 1950–1953 of work on *Perilla ocymoides* and *Nicotiana rustica* have shown that photosynthetic activity and chlorophyll content were greatest during flowering. Respiration rate gradually declined with growth. Leaves of the upper tiers were characterized by the most intensive respiration and photosynthesis and the highest chlorophyll content. This correlation was greatest in the case of respiration as the differences in photosynthesis and chlorophyll content changed during development. Alterations in carbohydrate content during development were associated with the type of carbohydrate metabolism of a given plant. The dynamics of the physiological processes can change over a comparatively wide range under the influence of external conditions.

1030. Levitt, J.
The rôle of cell sap concentration in frost hardiness.
Plant Physiol., 1957, **32**: 237-9, bibl. 1, illus.

Hardy plants of both cabbage and *Saxifraga cordifolia* showed very definite increases in frost hardiness (2 to 6° C.) as a result of infiltration with molar glycerine solutions, followed by evaporation of the water so absorbed. In cabbage the increases in hardiness agreed very well with the calculated increases on the basis of a purely osmotic effect. In *Saxifraga* the increases were somewhat less than expected. It is suggested that the results with *Saxifraga* are related to the lower temperatures that this plant can survive. The increased stiffening of the protoplasm with the drop in temperature may partly counteract the osmotic protection by slightly reducing the tolerance of dehydration. [From author's summary.]—Univ. Missouri, Columbia.

1031. Gunar, I. I., Krastina, E. E., and Petrov-Spiridonov, A. E.
Rhythm in the absorbing and excreting activity of roots. [Russian, with English summary ½ p.]
Izv. Timiryazev. seljsk. Akad., 1957, No. 4, pp. 181-206, bibl. 93.

Diurnal variations in the absorption and excretion of K, Ca and NO_3 (measured by polarography) and PO_3 and SO_4 (by radiometry) by the roots of bean, tomato, squash and other plants were studied. A definite rhythm with a period of several hours was found in absorption and also a pulsation in the excretion of PO_3 and SO_4 of 15–30 minutes' duration.

1032. BORTHWICK, H. A.
Light effects on tree growth and seed germination.
Ohio J. Sci., 1957, **57**: 357-64, bibl. 18, illus.

After reviewing many of these effects, the author concludes that they are the result of a single basic photochemical reaction, the outstanding characteristic of which is its photoreversibility by red and far-red radiant energies. The product formed by these energies has the characteristics of an enzyme.—Agric. Res. Serv., U.S. Dep. Agric., Beltsville, Md.

1033. HESLOP-HARRISON, J., AND HESLOP-HARRISON, Y.
Photoperiod, auxin and sex balance in a long-day plant.
Nature, 1958, **181**: 100-2, bibl. 7, illus.

Two cultivars of *Silene pendula*, a long-day plant with monoclinous flowers, were grown to an age of 40 days in long days (21–22 hr.) and then half of each group was transferred to short days (8 hr.) for 50 days; all plants were then given long days for a further 40 days. At the end of this treatment period, male fertility was consistently high in plants which had received short-day treatment, whereas all plants grown throughout in long days were male sterile to a greater or lesser extent. Male sterility was associated with an enlarged ovary and calyx and reduced corolla size. General application of NAA in aqueous solution induced male sterility under conditions in which control plants showed normal fertility, but as the concentration of NAA producing this effect was sufficient to damage the plants it was not possible to conclude that loss of male fertility was a specific auxin effect. In further experiments with auxin, however, treatment of leaves of individual branches with 0·5% NAA in lanolin paste strikingly depressed male fertility and induced earlier development of the gynoecium. In a few instances auxin treatment of the leaves resulted in parthenocarpy. It is concluded that morphologically and histologically the effects produced by photoperiodic and auxin treatment are very much alike. The similarity of the reaction suggests that the influence of photoperiod on sex balance may be exerted through the native auxin metabolism of the plant during the period of flower differentiation.—Queen's Univ., Belfast.

1034. TALBERT, C. M., AND HOLCH, A. E.
A study of the lobing of sun and shade leaves.
Ecology, 1957, **38**: 655-8, bibl. 6, illus.

Thirty-seven species were studied. The majority of the sun leaves were darker, more hairy and had more pronounced veining and marginal serrations than the shade leaves. Sun leaves were also more deeply lobed, had larger areas, longer petioles and greater thickness than the shade leaves.—Denver Univ., Colorado.

1035. MILBURN, T. R.
Water absorption by submerged leaves.
Nature, 1957, **180**: 1368, bibl. 5.

Single leaves of *Bignonia grandiflora* were severed under water, and were then held in a saturated atmosphere and subjected to various periods of light and darkness before being submerged in aerated, distilled water and either strongly illuminated or kept in the dark. The pre-treatment in a saturated atmosphere was found to have a marked effect on the subsequent behaviour of the leaves when submerged. Thus leaves pre-treated for a period in darkness and then illuminated absorbed water when submerged and illuminated, whereas leaves pre-treated in the light and then in darkness did not absorb water. Absorption following pre-treatment in the dark only occurred when the CO_2 concentration of the water was raised. It is thought possible that these findings may help to explain the divergent results reported by earlier workers.—Dep. Bot., Makerere Coll., Kampala, Uganda.

1036. POLSTER, H., AND REICHENBACH, H.
Ein Verfahren zur Prognose der vitalen Dürreresistenz durch Ermittlung des Stomataregulationsvermögens abgeschnittener Pflanzensprosse. (**A method for the prognosis of drought resistance by determining the capacity for regulating stomatal movement in cut plant shoots.**)
Biol. Zbl., 1957, **76**: 700-21, bibl. 28, illus.

The stomatal response to intermittent light and varying degrees of soil moisture saturation was studied in cut poplar shoots from one-year-old clonal material.—Inst. Forstwiss., Tharandt.

1037. THORUP, S.
Breaking dormancy of beech.
Physiol. Plant., 1957, **10**: 728-31, bibl. 7.

Rindite, consisting of ethylene chlorhydrine, ethylene dichloride and carbon tetrachloride, was applied to branches and young trees of beech at various dates between 15 November and 6 January. The buds began to open 2–3 weeks after treatment. In many cases there was quite a strong development of adventitious buds before leafing of the original buds.—Lab. Plant Physiol., Univ. Copenhagen.

Irradiation.

(*See also* 1081e, m, 1082q, t, w, 1130, 1132, 1159, 1169y, 1529, 1692.)

1038. GULJAKIN, I. V., AND JUDINCEVA, E. V.
The effect of radioactive fission products on, and their accumulation in, plants as affected by their distribution in the soil. [Russian with English summary ½ p.]
Izv. Timiryazev. seljsk. Akad., 1957, No. 3, pp. 53-80, bibl. 18, illus.

In pot and field experiments various amounts of a mixture of long-lived isotopes were applied to the soil at different depths. The uptake and accumulation of the fission products rose with the increase of dosage up to a certain limit and then decreased. Uptake and accumulation were reduced in proportion to depth of application, and application of lime and humus to a turf-podzolic soil resulted in a further reduction in the radioisotope content of plants. Wheat and millet were more sensitive to radiation than pea and oats, though the radioisotope content of pea vines was rather high.

1039. Guljakin, I. V., and Judinceva, E. V.
The uptake of radioactive fission products by plants and the biological purification of soil from them. [Russian, with English summary $\frac{1}{2}$ p.]
Izv. Timiryazev. seljsk. Akad., 1957, No. 3, pp. 81-109, bibl. 40, illus.

The uptake of a number of radioactive fission products and their mixtures by beans, peas and some other plants from water solution and various soil types was studied. In water culture large quantities, especially of Sr^{90} and Cs^{137}, were absorbed with little effect on growth or yield. In soils the uptake of Cs^{137} was greatly reduced, while Sr^{90} was taken up more intensively from light than from heavy soil. Legumes were found particularly suitable for purifying the soil from radiostrontium.

1040. Peredel'skij, A. A., and others.
The rôle of earthworms in the purification of soil from contamination with radioactive isotopes. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1957, **115**: 809-12, bibl. 2.

In experiments at the Biophysical Laboratory of the Ural branch of the Academy of Sciences a number of plants, including pea and hemp, were grown in 2 large wooden containers in each of which a strip of soil was treated with Co^{60}Cl$_2$. A complement of earthworms was added to one of the containers. Determinations of the radioactivity 24 and 44 days after the commencement of the experiment showed that the presence of earthworms greatly increased the amount of Co^{60} in all plants grown in the treated strip. Thus the earthworms accelerated the removal of the isotope from the soil.

1041. Vlasjuk, P. A.
The basic principles of the biological action of small doses of nuclear radiation. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1957, **22**(10): 8-14.

In studies at the Ukrainian Academy of Agricultural Sciences and elsewhere it was found that, when the level of radiation obtained by adding artificial radioactive isotopes to the nutrient medium does not greatly exceed the natural level of radioactivity, the intensity of physiological processes was increased in the majority of experiments, resulting in increased vitality and productivity of plants. Among many examples given showing the effect of low rates of radioactive nutrients are the following: In 1951 very small doses of Co^{60} applied to the late tomato variety Krasnodarec advanced the date of ripening by 5–7 days. In 1952, the early tomato variety Majak 12/20-4, top dressed with Co^{60} at 3 microcurie per plant, yielded 255 cwt./ha., and at 9 mc. 306 cwt./ha., compared with 209 cwt./ha. in the controls. The variety Krasnodarec treated with Co^{60} at 12 mc. yielded 308 cwt./ha. compared with 202 cwt./ha. in the controls. The stable isotope Co^{59} applied at similar and higher dosages increased yields by only 5·4–7·7%. Foliage application of radioactive P also increased tomato yields, as did radioactive Zn treatment of seed. Radioactive P applied to the soil did not increase the yield of kok-saghyz roots, but labelled Co and U gave 14 and 12·2% increases respectively. Foliar nutrition with radioactive isotopes reduced hemp yields. Soil application of labelled P increased vine and tea yields. The effect of radioactive isotopes was most marked under unfavourable ecological conditions.

1042. Porjadkova, N. A.
Methods and results of experiments on radiostimulation of plants. [Russian.]
Biofizika, 1956, **1**(7): 597-615, bibl. 13, from *Ref. Ž. (Biol.)*, 1957, No. 15, Abstr. 64,499.

The efficacy of different methods of plant irradiation by various radiants of equal dosage was studied. Solutions of β and γ radiating uranium fission products, containing Sr^{89}, Sr^{90}, Y^{90}, Zr^{95}, Nb^{95}, Ru^{106}, Cs^{137} and Ce^{144}, were distributed in the plants in different ways. Soaking pea seed for 20 hrs in a solution with a β-radiation of 0·5 mc./l. gave more vigorous plants and an increase of 30–71% in yield. A comparison between solutions of mixed fission products (β- and γ-radiation) 0·25–20·0 mc./l. and radium (mainly α-radiation) 0·0125–1·0 mc./l. showed β-radiation to be stimulating in small doses and depressing in large doses, while radium depressed at all rates proportionately. An increase in the weight of the vegetative organs was produced by the irradiation of swelling pea seeds with X-rays (100r/min.) and γ-rays from Co^{60} (150–250r/min.) for 24 hrs. Of dry, swelling and germinating seeds treated with high dosages of X-ray, the dry seed showed the greatest radiation resistance. After dealing with the irradiation of other crops the author considers that the most promising method is external irradiation which assures the absence of radioactive contamination of the crops.

1043. Celiščev, S. P., and Mogilevkin, V. B.
Studies on the biological effect of neutrons on plants. [Russian, with English summary $\frac{1}{3}$ p.]
Izv. Timiryazev. seljsk. Akad., 1957, No. 3, pp. 33-52, bibl. 21, illus.

The growth of pea seedlings was delayed when the seed was irradiated in a nuclear reactor with thermal neutrons, the delay being greatest 10–11 days after germination. Soaking the seed in boric acid before irradiation increased this effect. A study of P^{32} distribution showed that the nucleoprotein fraction was the most active.

Growth substances.

(*See also* 1081h, i, p, 1082c, l, r, 1112, 1113, 1139, 1142-1146, 1180, 1190, 1204, 1205, 1209, 1211, 1370, 1396, 1440-1443, 1484, 1485, 1510, 1511, 1568-1570, 1573, 1602h, 1699, 1700, 1703, 1706, 1707, 1709, 1775, 1776, 1785y, 1805, 1957, 1995.)

1044. Vardar, Y., and Acarer, P.
Auxin in relation to the development of epiphyllous buds in *Bryophyllum*. [Spanish summary $\frac{1}{4}$ p.]
Phyton, 1957, **8**: 109-19, bibl. 36, illus.

The origin and normal development of epiphyllous buds on the leaves of *Bryophyllum daigremontianum* were studied. When young plants with 3 pairs of leaves were treated with TIBA, decapitated, or had the vessels between lamina and petiole cut, an acceleration in the development of epiphyllous buds was observed.

IAA treatment of the young plants retarded the development of epiphyllous buds. It is concluded that epiphyllous bud development is related to the auxin level in the plant.—Univ. Istanbul.

1045. Kiermayer, O.
Morphologische Veränderungen an den Blüten von *Kalanchoë blossfeldiana*, sowie den Brutpflanzen von *Bryophyllum tubiflorum* durch synthetische Wuchs- und Hemmstoffe. **(Morphological changes in flowers of *Kalanchoë blossfeldiana* and in vegetatively produced plantlets of *Bryophyllum tubiflorum*, caused by synthetic growth-stimulating and inhibiting substances.)** [Spanish summary ½ p.]
Phyton, 1957, **9**: 53-64, bibl. 18, illus.

Long-day kalanchoë plants at an early stage of flowering did not respond visibly to $2\cdot5\times10^{-2}\%$ or $2\cdot5\times10^{-1}\%$ sprays of either 2,4-D, 2,4,5-T or 2,3,5-triiodobenzoic acid. Both 2,4,6-T at the higher and 2,3,6-T at the lower of these concentrations induced cohesion of either sepals or petals in some but not all of the flowers. At the higher concentration, however, 2,3,6-T caused every flower to develop a completely tubular calyx and corolla, with bracts united to form a funnel and dwarfed reproductive parts. Short-day kalanchoë plants, almost fully in flower, were sprayed with 2,4-D at both the above concentrations, the higher of which proved lethal. Some flowers became tubular, some remained normal, but in the majority some or all of the sepals and petals were completely separate, frequently with duplication of these and reproductive parts. Tall (20–25 cm.) and short (10–15 cm.) plants of bryophyllum were sprayed with $2\cdot5\times10^{-1}\%$ solutions of various growth substances. In the tall plants neither eosin nor IAA caused morphological changes.
With 2,4-D the plantlets produced on the edges of leaves were goblet-shaped and adventitious roots grew from the plant's nodes. With 2,3,5-triiodobenzoic acid the shoot tips formed funnels, bearing normal or goblet-shaped plantlets between the serrations on their rims. The result with 2,4,6-T was similar, and in addition some of the normal leaves produced "goblet" plantlets. The strongest action was shown by 2,3,6-T, which turned all shoot tips into "funnels" and all plantlets into "goblets". The leaves of the pair immediately below each deformed shoot tip were pointed, unserrated and bore no plantlets. The short plants were killed or severely injured by 2,4-D, 2,3,5-triiodobenzoic acid or 2,3,6-T. Those treated with 2,4,6-T developed "funnel" shoot tips with an unserrated pair of leaves below. None of the short plants had produced plantlets. Premature development of lateral shoots from the upper leaf axils was a further effect of 2,4,6-T.

1046. Åberg, B.
Studies on plant growth regulators. XIII. Some experiments with cress roots.
Ann. roy. agric. Coll. Sweden, 1957, **23**: 479-87, bibl. 25.

The effects on cress roots of 4 growth regulators, including 2 auxins (IAA, 2,4-D), an antiauxin naphthylmethyl sulphide propionic acid (NMSP) and a substance with complex effects (triiodobenzoic acid), have been studied. No significant stimulation of cress root growth by IAA or 2,4-D could be detected. NMSP causes a significant stimulation at concentrations which also powerfully counteract growth inhibitions caused by IAA and 2,4-D. Triiodobenzoic acid gives a concentration-response curve of a form similar to those obtained for IAA and 2,4-D. [From author's summary.]—Inst. Plant Physiol.

1047. Furuya, M.
Effects of the vapour of methyl 2,4-dichlorophenoxyacetate on growth and differentiation in *Phaseolus vulgaris* L. II. Behaviour of decotylated embryos in germination *in vitro* and the rôle of cotyledons in formative response.
Jap. J. Bot., 1956, **15**: 270-84, bibl. 17, illus.

Formative effects in bean growing points, following methyl 2,4-D treatment of dry intact seeds, were induced only via the treated cotyledons and not as a result of direct contact of the substance with growing-point cells. [For part I see *H.A.*, 26: 3662.]—Univ. Tokyo.

1048. Niizeki, S., Furuya, M., and Chikubu, S.
Effects of the vapour of methyl 2,4-dichlorophenoxyacetate on growth and differentiation in *Phaseolus vulgaris* L. III. The distribution of thiamine in the seedlings.
Jap. J. Bot., 1956, **15**: 285-96, bibl. 15, illus.

Graphs show clearly the variations in total and free thiamine in whole bean seedlings and in their different organs over the first 14 days of growth in light and in darkness. Test seeds were treated with methyl 2,4-D before soaking. The two curves for total thiamine in light- and dark-grown control seedlings showed marked variation and each was almost the inverse of the other, but values for test seedlings remained virtually constant after the 2nd or 3rd day, being higher in light than in darkness. The only other important effect of treatment was a strong check on accumulation of total thiamine in the first leaves in light-grown seedlings.

1049. Chandler, C.
The effect of gibberellic acid on germination and pollen-tube growth.
Contr. Boyce Thompson Inst., 1957, **19**: 215-23, bibl. 5, illus.

For a study of the effect of gibberellic acid (GA) on cell elongation, pollen was collected at random from 27 plants representing 16 different families and was cultured on a sucrose-agar medium. Gibberellic acid in concentrations of 31·25 to 1,000 mg./l. was added to this medium. The percentage of germination and the rate of growth of the pollen tubes on the control and GA media were compared. Pollen from 9 plants gave no germination on the control medium and was not stimulated by the addition of GA to the medium. Pollen from 10 plants germinated on all media but tube growth was greatly inhibited by all concentrations of GA which caused coiling, enlarging of tips of tubes and even exuding of cytoplasm. Pollen from one plant [*Lilium speciosum* var. *rubrum*] which did not germinate on the control medium and would have been considered non-viable gave good germination in the GA medium. Pollen from 7 plants [*Linaria vulgaris, Lonicera japonica, Petunia hybrida* var. Snowstorm, *Verbena hybrida* (2 varieties) and 2 plants of *Lilium speciosum* var. *rubrum*] showed an increase in the percentage of germination and a marked increase in tube length when GA was added to the medium. [Author's summary.]

1050. Vasil, I. K.
Effect of kinetin and gibberellic acid on excised anthers of *Allium cepa*.
Science, 1957, **126**: 1294-5, bibl. 10, illus.

Onion anthers excised at the leptotene–zygotene stage and cultured in White's medium degenerated within 2 days. When either kinetin at 0·05 mg./l. or gibberellic acid at 5 mg./l. was added to the medium, however, the anthers grew satisfactorily and produced tetrads and one-celled microspores. When both growth substances were added development was as good as, or slightly better than, the development observed on the plant. This proof that gibberellic acid causes cell division is further evidence in favour of its being an auxin.—Univ. Delhi.

1051. Gray, R. A.
Alteration of leaf size and shape and other changes caused by gibberellins in plants.
Amer. J. Bot., 1957, **44**: 674-82, bibl. 13, illus.

Spraying certain plants with gibberellic acid altered the shape of the new leaves that were produced for several weeks after treatment. Leaves of treated tomato plants developed smooth edges (entire) instead of the normal indented edges (dentate). Leaves of treated tobacco and African violet plants were more elongated and pointed at the apex and pepper [*Capsicum*] leaf surfaces were rough instead of smooth. The width and length of bean leaf blades were increased 22 and 32%, respectively, and the length of bean leaf petioles was increased 50% by treatment with gibberellins. The height of Pinto bean plants was proportional to the log of the concentration between 0·25 and 1·0 p.p.m. gibberellic acid and the resulting curve could be used in assaying unknown samples. One spray of 1 p.p.m. gibberellic acid caused a 4·8-fold increase over the controls in the height of Pinto bean plants in one week. Dry weight of bean and pepper plants was increased 25% in one week by one spray containing 10 p.p.m. gibberellic acid. The concentration of gibberellins in the sprays was critical in regard to certain effects on Pinto bean plants. Spraying tomato and pepper plants at transplanting time with a level of 10 p.p.m. gibberellic acid prevented the checking of growth that normally follows transplanting of these plants. A spray containing 50 p.p.m. of a gibberellin A mixture applied to Bonny Best tomato plants when they were transplanted from the greenhouse to the garden outside increased the yield of tomatoes 40% and inhibited sucker growth. When seeds of some plants were coated with a gibberellic acid-methyl cellulose slurry, dried, and planted, the seedlings came up faster and grew taller than seedlings from untreated seeds. [Author's summary.]—Merck & Co. Inc., Rahway, N.J.

1052. Nickell, L. G.
Gibberellin and the growth of plant tissue cultures.
Nature, 1958, **181**: 499-500, bibl. 3.

When crown gall or callus tissues of sunflower, tobacco, *Vinca rosea* and *Melilotus officinalis*, which had been cultured for 7 years, were treated with 10 p.p.m. of gibberellin, some of the test materials exhibited clear growth stimulation and others even more pronounced growth inhibition.—Biochem. Res. Develop. Div., Chas. Pfizer and Co., N.Y.

1053. Ghillini, C. A.
L'acido gibberellico e le prospettive sulle possibili applicazioni pratiche in agricoltura. **(Gibberellic acid and the possibilities of its practical application in agriculture.)**
Agric. Venezie, 1957, **11**: 647-50.

Results of recent field experiments suggest that gibberellic acid is very limited in its practical application. It gave no significant yield increase in gooseberries, tomatoes, peas and beans when sprayed at 140 g. per ha. In greenhouse experiments it has increased the length of hemp (*Cannabis sativa*) fibres. Instances of advancement of flowering in biennials and of breaking of dormancy by gibberellic acid in laboratory experiments have not yet been confirmed in the field.

1054. Izard, C.
Recherches sur le role physiologique de la nicotine. I. Inhibition de croissance en présence de nicotine et autres inhibiteurs. **(Studies of the physiological action of nicotine. I. Growth inhibition in the presence of nicotine and other inhibitors.)** [English summary 6 lines.]
Ann. Inst. exp. Tabac Bergerac, 1957, **2**(4): 11-26, bibl. 6.

Nicotine reduced the growth rate of oat coleoptiles; increasing the pH in the presence of nicotine had the same effect. Nicotine reduced the growth-stimulating effect of indole β-acetic acid but augmented the inhibiting effect of sodium fluoride and, at low concentrations, that of phloridzin. Nicotine was shown to maintain a high level of phosphate in the tissues and the addition of phosphate augmented the growth-inhibiting action of nicotine. It is suggested that the effect of nicotine is to inhibit phosphorylation, and it was observed that the addition of adenoxin-3-phosphoric acid suppressed the inhibiting effect of nicotine.

1055. Takeda, A., and Senda, J.
Studies on the synthesis of plant growth substances. I. Growth promoting activity of the mono-substituted N-phenylglycines. [In English.]
Ber. Ōhara Inst. landw. Biol., 1957, **11**: 1-11, bibl. 36, illus.

Some mono-substituted N-phenylglycines and related compounds were tested for their growth-promoting activity in *Phaseolus angularis* plants, using a new technique. The highest activity was shown by the 3-nitro and 4-chloro derivatives. N-arylglycine was shown to be an active growth-promoting substance when the ring is properly substituted. J.R.L.

Seeds.

(*See also* 1081a, f, n, 1082d, 1383-1386, 1486, 1489-1491, 1689, 2025.)

1056. Friedberg, L.
Détermination et conservation de la faculté germinative des graines. **(The determination and preservation of seed viability.)**
J. Agric. trop. Bot. appl., 1957, **4**: 303-14, bibl. 9, illus.

The numerous abnormalities found in germinating seeds and the problems of seed testing call for more precise standardization of conditions at seed testing stations.

1057. Stelter, J., Wolters, K., and von der Straten, I.
Einfluss von Ultraschall auf die Keimung von Saatgut und die Entwicklung der Pflanze sowie Prüfung der Verwendungsmöglichkeit des Ultraschalls in der Phytopathologie. **(The effect of ultrasonics on the germination of seed and the development of the plant and the possible use of ultrasonics in phytopathology.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1957, **9**: 166-70, bibl. 11, illus.

Experiments with barley seed exposed to ultrasonic radiation led the authors to the following conclusions: The treatment promoted the swelling of the seed and thus indirectly accelerated germination, but at present no practical application of these findings seems likely. A combination of ultrasonic radiation with certain chemicals may, however, have a future use in the disinfection of seeds.—Tech. Hochsch. Aachen and ForschAnst. Landw., Braunschweig-Völkenrode.

Nutrition.

(*See also* 1082s, u, 1376, 1705, 2008, 2011.)

1058. Jackson, W. A.
Carbon dioxide fixation by plant roots and its influence on cation absorption.
Diss. Abstr., 1957, **17**: 1650, being *Publ.* 21,895 of 172 pp.

Experiments with bean roots and various salt solutions were conducted to determine the relationship between organic acid production and cation absorption. A solution of pH above 7 resulted in the accumulation of organic acids in the roots, especially of malate. In the presence of ammonium ion, CO_2 fixation was not appreciably reduced, but aspartate or glutamate rather than malate accumulated. Potassium and Ca absorption was associated with organic acid accumulation, and there were indications of 2 mechanisms for K accumulation. Roots lost inorganic cations, organic acids and amino acids to external solutions. Loss of K and Ca was increased by low pH and by the presence of Al in the substrate. Loss of organic components was increased sharply below pH 4, but amounts lost were not directly related to their concentration in the tissue. Exudation of amino acids to the external solutions was increased by the presence of KCl and decreased by $CaCl_2$. A substance which inhibited subsequent K absorption from KCl solutions was secreted from bean roots, but K uptake from potassium bicarbonate was not inhibited.—North Carolina St. Coll.

1059. Bond, G.
Isotopic studies of nitrogen fixation in non-legume root nodules.
Ann. Bot. Lond., 1957, **21**: 513-21, bibl. 17.

Isotopic studies are presented on 6 of the 8 recognized non-legume, nodule-forming genera of Angiosperms. Evidence has been obtained of the occurrence of fixation of atmospheric N in the root nodules of *Casuarina*, *Ceanothus*, and *Shepherdia*, now examined isotopically for the first time. In further studies of the N-fixing nodules of *Hippophaë* and *Alnus* it is shown that the fixation continues for a longer period after detachment from the plant than is the case with legume nodules, and that the enrichment in ^{15}N which they (and also detached *Casuarina* nodules) finally achieve after exposure to excess of the free isotope considerably exceeds that shown by detached legume nodules. Fixation in detached *Myrica* nodules was not clearly affected by reduction in oxygen supplied until the proportion of oxygen was less than 5%. [Author's abstract.]—Bot. Dep., Univ. Glasgow.

1060. Hutton, R. G., and Nye, P. H.
The rapid determination of the major nutrient elements in plants.
J. Sci. Food Agric., 1958, **9**: 7-14, bibl. 22.

A rapid method has been developed in which N, P, K, Ca, Na and Mg are determined in a single solution, obtained by digesting plant material with sulphuric acid and Se. The analysis can be conducted with an error not exceeding 5%. [Authors' abstract.]—Univ. Coll. Ghana, Achimota.

1061. Bussmann, A.
Über die Anwendung der trockenen und nassen Veraschung bei der Nährstoffanalyse von Apfelholz und Apfelblättern. **(On the use of the dry and the wet ashing methods for the analysis of apple wood and apple leaves.)**
Z. PflErnähr. Düng., 1957, **77**: 212-18, bibl. 10.

Both methods gave the same values for P, K, Ca, Mg, Zn, Fe and Mn contents, but dry ashing proved more convenient for large and wet ashing for small samples. Recommendations for the analytical procedure are made.—Wädenswil. [See also *H.A.*, 27: 2020.]

1062. Lamb, K. P.
Quantitative micro-analysis of leaf tissue for certain organic constituents with special reference to sampling error.
N.Z. J. Sci. Tech., Sect. B, 1957, **38**: 1009-17, bibl. 23.

Procedures [based on work on swede and broad bean leaves] are given for quantitative estimation of total N, amino N fractions and soluble carbohydrates in microgram amounts in discs of leaf tissue weighing approximately 5 mg. (fresh) or 1 mg. (dry). Statistical aspects of sampling and analytical errors are considered in detail. [Author's summary.]—D.S.I.R., Auckland.

1063. Rogalev, I. E.
Differentiation of fibrovascular bundles and xylem vessels as affected by phosphorus nutrition of plants. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1957, **115**: 1206-8, bibl. 5.

P nutrition stimulated the formation of fibrovascular bundles and xylem vessels in several crop plants. In tomato stems the width of the vascular ring and the number of xylem vessels were greatest when normal rates of N and K were applied with a double rate of P.

Irrigation.

(*See also* 1075, 1081z, 1082h, v, 1116, 1368d, 1564, 1565.)

1064. Till, M. R.
A method of measuring the evaporation loss from sprinklers.
J. Aust. Inst. agric. Sci., 1957, **23**: 333-4, bibl. 3.

By estimating the increased chloride concentration of the water collected where the spray reaches the ground over that of the water as it leaves the sprinkler. Figures of the order of 2% were obtained in Australia.

1065. Achtnich, W.
Eine Methode zur Berechnung des Wasserverbrauchs der Pflanzen mit Hilfe klimatologischer Daten. **(A method of determining the water consumption of plants with the aid of climatological data.)**
Z. PflErnähr. Düng., 1957, **79**: 97-101, bibl. 12.

The plant coefficients for determining water requirements of crops according to the formula of H. F. Blaney and W. D. Criddle (U.S. Dep. Agric., Soil Cons. Serv., Washington, D.C., 1950) have been listed in this paper for deciduous fruits and nuts, citrus, vegetables, tobacco, coffee and some other crops.

1066. Slatyer, R. O.
The significance of the permanent wilting percentage in studies of plant and soil water relations.
Bot. Rev., 1957, **23**: 585-636, bibl. 174.

A critical examination of the literature has given rise to the author's theory that the permanent wilting percentage, instead of being, as is generally claimed, a soil constant, is essentially dependent on the plant under study and is determined by the osmotic pressure in its leaves. The standard laboratory determination would provide a general index of the lower limit of soil water availability for growth of mesophytes, but would be misleading if applied to plants on saline or arid soils. If need exists for an approximate and general reference point for soil water availability, it is suggested that direct determinations of permanent wilting percentage could be replaced by physical soil determinations at definite levels (e.g. 15 atm.) of total soil moisture stress.

1067. Bouwer, H., and Helms, J. O.
Flexible tubing in sprinkler irrigation.
Agric. Engng. St. Joseph, Mich., 1957, **38**: 794-9, illus.

The labour requirements of sprinkler systems with branched flexible laterals, branched aluminium laterals and unbranched flexible laterals were studied and the superiority of the first type demonstrated. Suitable designs are considered and a cost analysis prepared.

Glasshouses.

(*See also* 1676-1678.)

1068. Moore, E. L., and Ray, K. R.
Plastic greenhouse construction.
Miss. Fm Res., 1957, **20**(8): 8, illus.

The design and construction of a plastic greenhouse built at the Mississippi State College is described in detail. Possible modifications are suggested and the type of heating system is discussed.

1069. Sheard, G. F., and Hoare, E. R.
Glasshouse heating: a progress report.
Exp. Hort., 1957, No. 1, pp. 1-4, bibl. 2.

Work on solid fuels at Fairfield Experimental Horticulture Station has shown that hand-firing of high-grade fuels is very expensive, whereas hand-firing of low-grade fuels such as coke breeze may be economic where supplies of reasonable quality can be obtained. Promising results are being obtained with a chain-grate stoker using washed smalls. With low-pressure steam heating, marked effects of temperature gradient in the house were noted on the yield and quality of tomatoes. Methods of reducing the temperature gradient are being investigated. An oil-fired hot air heater has not given wholly satisfactory results in a glasshouse used for tomatoes and pot chrysanthemums. [See also *H.A.*, 27: 2088h.]

1070. Lawrence, H. H.
Eastbourne heat pump.
Reprinted from *Elect. Rev.*, in *Park Administ.*, 1957, **22**: 342-6, illus.

The design and application are described of an experimental heat pump which has been installed in a greenhouse of the S.-E. Electricity Board. The heat source is the soil of a neighbouring orchard, in which are buried evaporator coils circulating a refrigerant. The heat pump itself is a commercial type refrigeration compressor driven by an electric motor. The high pressure side of the compressor discharges to a condensing unit, from which heat is taken at high temperature to heat water in a tank, which is then circulated through the greenhouse. The principle involves utilization of heat, in this case from the soil, which would otherwise be lost, thus conserving fuel.

1071. Emmert, E. M.
Plastic tubes cut heating costs.
Amer. Veg. Gr, 1957, **5**(10): 22, illus.

Preliminary tests showed that a greenhouse heated by hot air in plastic tubes placed between the rows produced a better quality crop of tomatoes at lower cost than did a greenhouse with a conventional steam heating system. Tests have shown that 3–4 mil. strength black plastic tubes were most economical. Aluminium foil laminated to clear polythene was very effective, but the best material was aluminium metalized black polythene. Four 6-in. tubes heated a house 20 ft. wide. Various pipe lay-outs are described. About 20–30 ft. of metal piping is needed between the heat source and the plastic pipes to prevent the latter from melting.—Univ. Ky.

J.R.L.

Machinery and apparatus.

(*See also* 1081s, 1082e, f, 1390, 1456, 1508, 1792, 2002, 2031.)

1072. The Commercial Grower.
Mechanisation in Horticulture, Autumn 1957, No. 8, pp. 21-50, illus.

Articles in this issue include: Specialized machinery will be needed for herbicides, by G. W. Laws; Onion harvesting, by A. G. Healey; Refrigeration an essential need in horticulture, by J. T. Herbert; and Farm constructed cold store and deep freeze chambers, by K. Oldroyd. Other subjects discussed are water pumps, trends in tractor development for growers, and a telescopic lift for packhouse loads.

1073. Hall, B. J., Curley, R. G., and MacGillivray, J. H.
Labor field-transit machines.
Calif. Agric., 1957, **11**(11): 14-15, illus.

These machines, which have been developed primarily for use in vegetable crops, are best described as labour transport machines. They consist essentially of a frame, mounted behind a slow moving tractor, which provides beds on which up to 8 men lie prone to perform such operations as thinning, weeding, trimming and planting. [Although a photograph provided makes the operation look acutely uncomfortable], studies on the use of these machines have shown savings in time of 30 to 40% when planting strawberries and peppers, of 25 to 50% when thinning and weeding several vegetable crops and of 60% when cleaning up strawberries in the winter.—Univ. Calif., Davis.

1074. van den Muijzenberg, E. W. B.
De spitmachine, een belangrijke Nederlandse vinding. **(The digging machine, an important Dutch invention.)** [English summary 5 lines.]
Meded. Dir. Tuinb., 1957, **20**: 747-9, illus.

A prototype of a digging machine which is described has given promising results, especially in preserving soil structure. The machine will probably be of value in the bulb-growing area and on peat soils.

1075. Šendrikov, G. L.
The use of the hydraulic drill in fruit growing and viticulture. [Russian.]
Priroda, 1957, **46**(10): 100-2, illus.

Hydraulic borers are being used with success for planting vines [see *H.A.*, 27: 2212 and 2213], for subsoil irrigation and fertilization of vines, tree and bush fruits and woody ornamentals, and for phylloxera control on vines. For phylloxera control distillation residues of dichlorethane are applied to a depth of 0·6–0·8 m. in the spring and 1·0–1·5 m. in the autumn. The autumn deep treatment can be accomplished only by hydraulic borers. [For more detailed accounts of treatment and the need for suitable apparatus see *H.A.*, 26: 411 and 412.]

1076. Lentz, C. P., and Rooke, E. A.
Use of the jacketed room system for cool storage.
Food Tech., 1957, **11**: 257-9, from *Food Sci. Abstr.*, 1957, Vol. **29**, No. 1868.

In a room cooled by circulation of cooled air through a surrounding jacket, tested with heat loads simulating the heat evolved by fresh produce stored at temperatures above freezing, relative humidity varied between 66 and 97%, and maximum spatial variations in temperature were between 0·5° and 3° F., depending on the amount and direction of air circulation in the jacket and the heat load and air movement in the room. Loss of water from fruit and vegetables in cool storage can be lessened by the use of jacketed rooms; celery stored in the test room lost weight at the rate of 1·25% per month, compared with 2·5% per month in a directly cooled room, and remained in appreciably better condition. Since heat loads of the size usually found in practice did not markedly increase spatial variations in temperature in the jacketed room, it should be of particular value for storing produce requiring accurate control of temperature.

1077. Phillips, G. L., and Nelson, H. D.
Permeability to methyl bromide of plastic- and rubber-coated fabrics.
J. econ. Ent., 1957, **50**: 452-4, bibl. 2, illus.

Polyethylene and vinyl films and synthetic rubbers, or fabrics coated with them, were found to be very effective in retaining methyl bromide vapour. Accidental contact with liquid methyl bromide was not serious unless the material was under stress. A table is given showing the permeability to the fumigant of 25 materials and the effect of its liquid form sprayed thereon.

1078. Hof, T.
Het conserveren van hout voor de tuinbouw. **(Wood preservation in horticulture.)** [English summary ¼ p.]
Meded. Dir. Tuinb., 1958, **21**: 17-26, illus.

Examples of 3 types of wood preservative were tested for their use under horticultural conditions. The best results were obtained with 2 copper-containing preservatives (2·9% and 0·5% Cu), a pentachlorophenol-containing material, and 2 water-soluble materials [trade names not given]. The best methods of treatment were application under pressure or by steeping for about 7 days.—Houtinstituut, T.N.O.

1079. Singh, U. P.
A note on the new technique of comparing stomata-size.
A.R. Fruit Res. Stat., Saharanpur, 1950–53, 1957, p. 63.

Stomatal size, as an indication of ploidy, can be measured from a dried film of "Durofix", removed from the leaf and stained.

1080. Durquety, P-M., and Magimel, R.
Action de films hydrofuges d'organo-siliciques sur le cycle végétatif et sur la résistance des végétaux à la sécheresse. **(The effect of water-repellent films of organic silicones on the vegetative cycle and on plant resistance to drought.)**
Rev. hort. Paris, 1957, **129**: 1734-7, bibl. 13, illus.

Treatment of vine leaves with an organic silicone film has resulted in reduced transport of water and metabolites, while gaseous exchange continued normally. Bud coatings have delayed bud burst and development in several fruit crops. The onset of wilting has been delayed by spraying plants with organic silicone solutions. The agricultural value of these effects is discussed.

Noted.

1081.

a Ahlberg, E.
Eräiden hitaasti itävien siemenien itävyyden määrityksestä tetrazolium-menetelmällä. **(On the determination of the germination capacity of slowly germinating seeds by the tetrazolium method.)** [German summary ½ p.]
Maataloust. Aikakausk., 1957, **29**: 143-9, bibl. 8.
The plants tested include *Prunus myrobalana*, *Pyrus communis* and *Rosa canina*.

b Balasubramanyam, P.
Impurities in air and their effect on plant life.
South Indian Hort., 1957, **5**: 82-99, bibl. 30.
A review mentioning many chemicals.

c Blinovskij, K. V.
25 years of the Turkmen Botanic Garden. [Russian.]
Tr. Turkm. bot. Sada AN TurkmSSR, 1956, No. 2, pp. 5-14, bibl. 25, from *Ref. Ž.* (*Biol.*), 1957, No. 15, Abstr. 64,386.
Development and functions [see also *H.A.*, 19: 5].

d Brown, P. H.
Efford.
Agriculture, Lond., 1958, **64**: 497-501.
A description of the largest of the N.A.A.S. Horticulture Stations.

e Canham, A. E.
Artificial light in horticulture.
Coop. elect. Res., 1958, No. 4, pp. 21-6, bibl. 2, illus.
Including supplementary lighting (with 7 types of lamp), bulb forcing and day-length control.

f Casini-Ropa, G.
La selezione meccanica dei semi. **(Mechanical seed sorting.)** [English and German summaries 3 lines each.]
Sementi elette, 1957, 3(4): 42-56, (5): 30-43, (6): 38-50, bibl. 19, illus.
Machines of 3 types, sorting according to size, weight, and skin texture or colour.

g Dedic, G. A., and Koch, O. G.
Zur Kenntnis des Spurenelementgehaltes von Pollen. **(Study of the trace-element content of pollen.)** [Spanish summary 7 lines.]
Phyton, 1957, **9**: 65-7, bibl. 21.
Contents of Al, Cu, Fe, Mn, Ni, Ti and Zn in pollen of hazel, *Tulipa suaveolens*, *Prunus avium* and *P. spinosa*.

h Ginzburg, B. Z.
Evidence for a protein component in the middle lamella of plant tissue: a possible site for indolylacetic acid action.
Nature, 1958, **181**: 398-400, bibl. 12.
Studies on the separation of pea root cells suggest that IAA acts as a chelating agent.

i Glasziou, K. T.
The effect of auxins on the binding of pectin methylesterase to cell wall preparations.
Aust. J. biol. Sci., 1957, **10**: 426-34, bibl. 13.
Cell wall preparations from tobacco pith and Jerusalem artichoke tubers used.

j Henriksen, A.
Kobberbestemmelser i jord i sammenligning med virkningen af kobbergødskning. **(Copper determination in the soil and the effect of copper fertilizers.)** [English summary 1¾ pp.]
Tidsskr. Planteavl, 1957, **61**: 685-717, bibl. 21.

k Jones, E. L.
N.A.A.S. Experimental Husbandry Farms: Rosemaund.
Agriculture, Lond., 1957, **64**: 390-4, illus.
Work on hops and cider apples described.

l Keller, P., and Deuel, H.
Kationenaustauschkapazität und Pektingehalt von Pflanzenwurzeln. **(Cation exchange capacity and pectin content of plant roots.)**
Z. PflErnähr. Düng., 1957, **79**: 119-31, bibl. 57.
Bean, tomato, tobacco among the 5 test plants.

m Klečkovskij, V. M.
The use of isotopes and nuclear radiations in agricultural research. [Russian, with English summary 12 lines.]
Izv. Timiryazev. seljsk. Akad., 1957, No. 3, pp. 6-32, bibl. 120.
A review.

n Lakon, G., and Bulat, H.
Die Feststellung der Keimfähigkeit der Leguminosensamen nach dem Topographischen Tetrazolium-Verfahren. **(The determination of the germination capacity of legume seeds by the topographic tetrazolium method.)**
Saatgut-Wirtsch., 1957, **9**: 267-70, 295-8, 325-7, and 1958, **10**: 11-17, bibl. 13.
Includes *Pisum*, *Vicia*, *Phaseolus* and many ornamental plants.

o Langer, R. H. M., and Canaway, R. J.
An automatic device for the control of day length.
J. hort. Sci., 1958, **33**: 58-61, bibl. 3, illus.
A reversible motor, with a time switch, moves side curtains and a spring-loaded top blind.

p LEBEN, C., AND ALDER, E. F.
The gibberellins.
Agric. Inst. Rev., 1957, **12**(6): 15-17, 55, illus.
A survey of plant responses and possible applications.

q LITVIN, F. F., AND KRASNOVSKIJ, A. A.
A study of the intermediate stages of chlorophyll formation in etiolated leaves based on their fluorescent spectra. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1957, **117**: 106-9, bibl. 12.
Chlorophyll formation from protochlorophyll in bean seedlings raised in the dark.

r MCCORKLE, C. O.
A statistical picture of California's agriculture.
Circ. Calif. agric. Exp. Stat. **459**, 1957, pp. 63, bibl. 41.
Figures on land, machinery, crops (including fruits, nuts and vegetables), etc.

s MAVRODINEANU, R., AND COE, R. R.
Method of dispensing volatile fluorides in portable greenhouses.
J. agric. Food Chem., 1957, **5**: 852-5, bibl. 4, illus.
For studying the effects of volatile fluorides on plants.

t MEDVEDEV, Ž. A.
The content of methionine, cystine and total sulphur in the proteins of various intracellular fractions of bean and sunflower leaves as a function of age of the plants. [Russian, with English summary 10 lines.]
Biohimija, 1957, **22**: 855-64, bibl. 33.
Quantitative determinations with S^{35} in plants grown in soilless culture.

u MEES, G. C., AND WEATHERLEY, P. E.
The mechanism of water absorption by roots. I. Preliminary studies on the effects of hydrostatic pressure gradients. II. The role of hydrostatic pressure gradients across the cortex.
Proc. roy. Soc. Ser. B, 1957, **147**: 367-80, bibl. 10, illus.; and 381-91, bibl. 17.
Using tomato as test plant.

v DE MONTLEAU, P., AND DELMAS, J.
Microdosage colorimétrique de l'azote des feuilles végétales. **(Colorimetric microdetermination of nitrogen in leaves.)**
Ann. agron., 1957, **8**: 499-502.

w MUKHERJEE, K. L.
Modifications in the colorimetric estimations of Mn and Mo.
Curr. Sci., 1957, **26**: 286-7, bibl. 2.
As applied to sugar cane at Banaras Hindu University.

x NITSCH, J. P.
Photoperiodism in woody plants.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 526-44, bibl. 62, illus.
A critical review.

y NÖMMIK, H.
An isotope dilution method for determination of nitrate in plant material.
Acta Agric. Scand., 1957, **7**: 389-94, bibl. 2.

z NORTH, J. J.
Some mechanical aspects of irrigation.
Agric. Rev. Lond., 1958, 3(9): 8-14, bibl. 4, illus.
By means of overhead watering.

1082.

a N.S.W. DEPARTMENT OF AGRICULTURE, BIOLOGICAL BRANCH.
Toxic effects of minor elements in plants.
Agric. Gaz. N.S.W., 1957, **68**: 474-6, illus.
Mn and B toxicity.

b OWADES, J. L., RUBIN, G., AND BRENNER, M. W.
Determination of food tannins by ultraviolet spectrophotometry.
J. agric. Food Chem., 1958, **6**: 44-6, bibl. 17.
Polyphenols of tea were very similar to those of hops in their ultraviolet absorption.

c PATTERSON, J. B. E.
Gibberellins and gibberellic acid.
N.A.A.S. Quart. Rev., Winter 1957, No. 38, pp. 139-43.
A survey.

d PINTO GANHÃO, J. F.
Notas sobre a desinfecção de sementes. **(Notes on seed disinfection.)**
Reprinted from *Agros*, [1957?], **40**(5): 269-83, bibl. 21.
A review, covering application of fungicides, heat, steam, radiation and antibiotics.

e PLANTIVEAU, P.
Les matières plastiques en horticulture. **(Plastic materials in horticulture.)**
Ann. Soc. nat. Hort. Paris, 1957, No. 11, pp. 310-13, bibl. 1, illus.
Irrigation pipes, shading, glass substitutes, soil covers and packaging of produce.

f PRESSED STEEL COMPANY LTD., COWLEY.
Plant environment control installation.
[*Publ.*] *Welsh Plant Breed. Stat., Aberystwyth*, [1957], pp. 2, illus.
Notes on construction of unit with 3 chambers, each 10 ft. 6 in. × 7 ft. × 6 ft. 6 in. high.

g RAUDNITZ, H.
Occurrence of humic acid in leaves.
Chem. Ind. Lond., 1957, No. 51, pp. 1650-1.
Present in rhododendron and other leaves as its phosphoric ester.

h REBOUR, H.
Étude sur le dosage des irrigations. **(A plan for calculating quantities when irrigating.)**
Fruits et Prim., 1957, **27**: 268-73, illus.
The theory of soil moisture behaviour and a guide to irrigation practice.

i RICHARDSON, K. E., AND AXELROD, B.
Changes in the inositol content during germination and growth of some higher plants.
Plant Physiol., 1957, **32**: 334-7, bibl. 14.
Including cabbage, mung bean and pea.

j ROBICHET, O.
Méthodes de dosage du fer. (**Methods for determining iron.**) [English, Russian and German summaries each ⅓ p.]
Ann. agron., 1957, **8**: 257-324, bibl. 122.

k SALO, M.-L.
Lignin studies. I. Investigations concerning lignin determination. [Finnish summary 7 lines.]
Maataloust. Aikakausk., 1957, **29**: 185-93, bibl. 25.
By a sulphuric acid method.

l SARKAR, S.
Gibberellic acid.
Sci. and Cult., 1957, **23**: 233-6, bibl. 11.
Chemistry and growth substance effects briefly reviewed.

m SCHARRER, K., AND MENGEL, K.
Die Bestimmung kleinster Mengen Magnesium für Zwecke der agrikulturchemischen Analyse. (**The determination of very small amounts of magnesium for agricultural purposes.**)
Z. PflErnähr. Düng., 1957, **77**: 18-36, bibl. 28, illus.
In plants and soils by the oxyquinoline method and flame spectrography. [See also *H.A.*, 27: 1085b.]

n SCHARRER, K., JUNG, J., AND JUDEL, G. K.
Vergleichende Untersuchungen über die Bestimmung von Mikronährstoffen mittels photometrischer und spektrochemischer Verfahren. (**Comparative studies on the determination of micro-nutrients by photometrical and spectrochemical methods.**)
Z. PflErnähr. Düng., 1957, **77**: 102-7, bibl. 10.
Results of plant analysis by both methods in good agreement.

o SCHARRER, K., AND WERNER, W.
Eine polarographische Methode zur quantitativen Bestimmung der l-Ascorbinsäure in Pflanzen. (**A polarographic method for the quantitative determination of l-ascorbic acid in plants.**)
Z. PflErnähr. Düng., 1957, **77**: 111-28, bibl. 17, illus.

p TURNER, J. S.
A decade of progress in plant physiology.
Aust. J. Sci., 1957, **19**: P147-P158, bibl. 67.
Progress in some fields reviewed and outstanding, including horticultural, problems discussed.

q U.S. DEPARTMENT OF AGRICULTURE.
Defense against radioactive fallout on the farm.
Fmrs' Bull. U.S. Dep. Agric. **2107**, 1957, pp. 16.
Including danger of contamination of vegetables and fruit.

r WARDLAW, C. W., AND MITRA, G. C.
Responses of a fern apex to gibberellic acid, kinetin and α-Naphthaleneacetic acid.
Nature, 1958, **181**: 400-1, bibl. 15, illus.

s WARINGTON, K.
Recent work on molybdenum and some micro-nutrient interactions.
Park Administ., 1957, **22**: 333-6, bibl. 46.
A review.

t WASSINK, E. C., STOLWIJK, J. A. J., AND HERINGA-WESTERHOF, A. C.
A bibliographical study on uptake and accumulation of nutrient elements by plants in view of the possible occurrence of radioactive isotopes of these elements among the waste of nuclear reactors.
Meded. LandbHogesch. Wageningen, 1956, **56**(16): 1-52, bibl. 174.

u WILLIAMS, J. H.
The importance of molybdenum in agriculture, with special reference to British conditions.
N.A.A.S. Quart. Rev., Winter 1957, No. 38, pp. 160-9, bibl. 62.
A review.

v WINTER, E. J.
The watering of field and glasshouse crops in the United Kingdom.
J. roy. hort. Soc., 1957, **82**: 476-83, bibl. 9, and 1958, **83**: 6-15, bibl. 15, illus.
The principles and practice of water application to plants.

w WITHROW, R. B.
An interference-filter monochromator system for the irradiation of biological material.
Plant Physiol., 1957, **32**: 355-60, bibl. 14, illus.
Smithsonian Inst. Washington, D.C.

x WOOLLEY, J. T., AND JOHNSON, C. M.
Silicon determination in ashed plant material.
J. agric. Food Chem., 1957, **5**: 872.

y ZALENSKIJ, O. V.
Relationships between photosynthesis and respiration. [Russian.]
Bot. Žurnal, 1957, **42**: 1674-90, bibl. 24, illus.
Basic studies using as test plants *Phaseolus vulgaris*, *Vicia faba*, *Prunus laurocerasus*, etc.

TREE FRUITS, DECIDUOUS.

General.

(*See also* 1081k, 1169i, m, n, q, u, 1170a, b, k, m, n, 1227, 2010, 2017, 2032, 2041, 2050.)

1083. KESTEREN.
Verslagen van de stichting "Boom en Vrucht" te Opheusden en het Rijkstuinbouwconsulentschap Kesteren over de jaren 1955-1956. **(Reports of the "Tree and Fruit" Institute at Opheusden and the State Horticultural Advisory Service at Kesteren for the years 1955-1956)**, received 1957, pp. 78, illus.

Very satisfactory results have been obtained from training apple trees in the palmette form, in which narrow rows are obtained, without loss of production as compared to the spindle bush form. Most of the experiments are concerned with apples, pears and cherries and their behaviour in relation to pruning, rootstock and interstock combinations, manuring and spraying. Brief reports are given in the Advisory Section on manurial and storage trials in several areas.

1084. WILHELMINADORP.
Jaarverslag 1956, Proefstation voor de Fruitteelt in de Volle Grond, Wilhelminadorp (bij Goes). **(Annual Report 1956, of the Experiment Station for Fruit growing in the Open, Wilhelminadorp (near Goes).)** [English summary 5 pp.], 1957, pp. 87, illus.

The Experimental Gardens: At Wilhelminadorp studies on rootstocks were continued, and rootstocks suitable for plums in Zeeland are listed; the behaviour of new apple varieties is described; a new plot has been planted to compare the spindle bush form for apples and pears with a flattened spindle bush and with hedge-planting forms; reversal of the soil profile (a heavy silt loam for 55 cm. over coarse sand) to a depth of 1 m. has resulted in increased growth and yield of apples; leaf fall from Cotswold Cross blackcurrants was considerable after application of sulphur-containing sprays. At Kapelle variety trials with soft fruits were continued. *Soil studies:* Some success has been obtained with magnesium nitrate sprays in correcting symptoms of Mg and N deficiency; most field trials with iron chelates (mainly Fe-EDTA) have given no positive results in combating Fe chlorosis. *Mycological studies:* In laboratory studies 0·1% Tuzet has had a curative effect against scab equal to that of 0·15% Nirit 45, but in field trials Tuzet showed signs of phytotoxicity; mixtures of wettable sulphur plus captan or thiram gave control of apple mildew equal to that of wettable S alone but used at higher concentrations than in the mixtures. *Entomological studies:* isolan (Primin) showed good leaf penetration in control of *Aphis pomi*; ekatin gave good control of woolly apple aphid. *Acarological studies:* Chlorocide, in general, gave more regular and effective control of *Metatetranychus ulmi* than PCPCBS, and good control was obtained with R6199 (amiton), Kelthane and Phenkapton; Kelthane and endrin were effective against black currant gall mite and strawberry mite. *Biocoenetic* and *Wind protection* studies are also reported.

1085. ZIOBROWSKI, S.
Rejony sadownicze Polski. **(Fruit districts in Poland.)** [English and Russian summaries 9 lines each.]
Reprinted from *Zesz. nauk. wyższ. Szkoły roln. w Krakowie*, 1957, No. 2, pp. 141-58, bibl. 17, map.

A map of Poland is given showing the division of the country into 10 fruit growing regions which in turn are split into smaller districts. The divisions are based on climatic and soil conditions and in some cases coincide with the range of certain wild plants.

1086. COLE, C. E.
Apples and pears in Victoria.
Fruit World, Melbourne, 1957, **58**(11): 5, 7, 9.

Forty-one % of all apple trees in Victoria are Jonathans and 15% Granny Smiths. These are followed in importance by Delicious, Rome Beauty, Ballarat and Yates. The actual acreage under apples, which reached a peak in 1932, is now about 16,000. Between 1932 and 1942 the average production per bearing tree was 0·8 bushels as compared with the present 1·5. Pear acreage has increased steadily and is now more than 15,000, with Williams covering 48% of the area and Packham's Triumph 30%, followed by Josephine and Beurré Bosc. Williams and Packham are strengthening their position, whereas Winter Nelis is becoming a competitor to Josephine.

1087. COOMBE, J., AND WATTS, A. T. J.
Apricot growing in New Zealand.
Bull. N.Z. Dep. Agric. **358**, 1957, pp. 47, bibl. 5, illus.

The total number of apricot trees in New Zealand is estimated to be about 121,000, of which about 80% are growing in Central Otago. This bulletin covers all aspects of their cultivation from choice of site to harvesting, grading and packing. The 7 leading varieties are described. Rootstocks and the problem of compatibility are discussed and photographs are included showing sections through a number of defective unions. Other subjects dealt with include soil management and nutrition, the pruning of young and old trees, frost protection, fruit thinning, and disease and pest control for which a spray programme is provided.

1088. ZITO, F.
Aspetti attuali e prospettive future della frutticoltura siciliana. **(Present status and future prospects of fruit growing in Sicily.)**
Reprinted from *Tec. agric.*, 1957, **9**: 127-49, illus.

Production of apples, pears, peaches, plums, apricots, cherries, figs, almonds and walnuts in Sicily compared with Italy; export figures for these products and for hazel and pistachio nuts from Sicily.

Breeding and varieties.

(*See also* 1169a, p, r, x, z, 1170d, e.)

1089. Brooks, R. M., and Olmo, H. P.
Register of new fruit and nut varieties. List 12.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 557-84.
New fruit varieties.
Amer. Fruit Gr, 1958, **78**(1): 30-1, 46-7, 49, illus.

Brief descriptions are given in the first article of the following varieties: 2 almonds, 35 apples, 2 apricots, 4 avocadoes, 2 barbados cherries, 2 beach plums, 5 blackberries, 4 blueberries, 1 buartnut, 1 carissa, 1 cherimoya, 7 cherries, 4 chestnuts, 4 filberts, 4 gooseberries, 9 grapes, 2 grapefruits, 3 heartnuts, 5 hickories, 2 lychees, 7 macadamias, 26 mangoes, 6 nectarines, 1 olive, 1 orange, 22 peaches, 7 pears, 3 pecans, 5 plums, 5 raspberries, 2 sapodillas, 11 strawberries, 22 walnuts, 1 white sapote. The second article is a greatly shortened account. Each article describes several varieties not described in the other.

1090. Knuth, Count.
The fruit variety trials at Knuthenborg, Denmark. Progress Report—1957.
Mimeo. Publ. Knuthenborg, Bandholm, Denmark, 1957, pp. 40, illus.

Since the publication of the previous report in 1951 [*H.A.*, 23: 2534] about 250 varieties and strains have been added, and about 100 have been rejected on commercial grounds. Apples of the McIntosh group have proved to be well adapted to Danish conditions, and other promising varieties are discussed. Variety lists are given of apples, pears, plums, cherries (sweet, Nanking, sour and brown), peaches, nectarines, almonds, apricots, quinces, raspberries, blackberries, elderberries, walnuts, chestnuts, heartnuts and grapes.

1091. Loewel, E. L., Schander, H., and Hildebrandt, W.
Untersuchungen zur Entwicklung von Frühselektionsmethoden für die Apfelzüchtung. 1. Über Beziehungen zwischen Blatt- und Fruchtmerkmalen beim Apfel. **(On the development of methods for early selection in apple breeding. I. On relationships between leaf and fruit characters in the apple.)**
Züchter, 1957, 4. Sonderheft, pp. 15-32, bibl. 64.

Three years' studies of 202 trees representing 50 apple varieties revealed the following correlations between leaf and fruit characters: The larger the leaf area, the heavier the fruit; the broader the leaf (in relation to its length), the flatter the fruit; the shorter the petiole (in relation to the length of the leaf), the heavier the fruit. Further reports on this long-term project will be published at intervals.—ObstbVersuchsanst. Jork.

1092. Bordejanu, T., Kočų, V., and Pandele, I.
Inter-varietal hybrids of peach and apricot in the Rumanian People's Republic. [Russian.]
Agrobiologija, 1957, No. 4, pp. 128-38, illus.

Fruit breeding and selection in Rumania is briefly reviewed, and the characters of the new peach variety Pervaja pjatiletka [First five-year plan] (Chevreuse tardive × ornamental peach *Amazona rubicunda*) and the hybrid apricot 1-0-49 (Silistra × Ananas) are described. The new peach is of particular interest; it was found to be resistant to frost, green aphid and leaf curl, highly productive and of very good flavour. Suitable rootstocks are now being sought.

1093. de Wet, A. F.
The canning peach: Simonsberg.
Dec. Fruit Gr, 1957, 7: 292-3, 302, illus.

This new seedling of Kakamas is similar to it but ripens about a week later. Nine-year-old trees bore a slightly heavier crop of larger fruits than similar Kakamas trees.—Western Province Fruit Res. Stat., Stellenbosch. J.R.L.

1094. Kol'cova, E. V.
Selection for economically valuable characters in hybrid plum seedlings. [Russian.]
Agrobiologija, 1957, No. 3, pp. 79-84.

Work in progress at Mičurinsk is described on developing frost resistant, productive, good quality plums suitable for central Russia. To date hybrids between local plum varieties from the Volga region (damsons and sloes) and Mičurin's variety Renklod Reforma show the best promise.

1095. Enikeev, H. K.
The origin of large-fruited sloe and damson. [Russian.]
Agrobiologija, 1957, No. 4, pp. 139-48, bibl. 15.

Results of biological and cytological investigations are presented. Various theories are expounded but it is finally suggested that plants in which the characters of sloe predominate should be called large-fruited sloes and be considered as hybrids of *Prunus domestica* × *P. spinosa*, whereas plants more closely resembling plums, usually referred to the independent species *P. insititia*, should be considered as variants of *P. domestica*.

1096. Teterev, F. K.
Prickly cherry.
Doklady vsesojuz. Akad. seljsk. Nauk, 1957, **22**(12): 16-19, bibl. 13, illus.

Plagiospermum [*Prinsepia*] *chinensis* was called by Mičurin prickly cherry (*Prunus plagiospermum*). The bush, producing juicy, edible fruits with flat, pitted stones, is described and the systematics of the genus are discussed. *P. chinensis* grows wild in the Soviet Far East and is also successfully cultivated there in open, sunny positions. It is propagated by seed and by soft- and hard-wood cuttings. Apart from fruit production prickly cherry could be used in breeding work with species and genera of Prunoideae, as a rootstock for European varieties and for biological studies.

Propagation and rootstocks.

(*See also* 1081a, 1169e, 1170j, 1193, 1676, 2003.)

1097. Douglas, J.
Vermenigvuldiging van fruitonderstammen.
(Propagation of fruit rootstocks.)
Fruitteelt, 1958, **48**: 68-9, illus.

Results of preliminary propagation experiments with leaf-bud cuttings of apple (M. IV and M. VII), pear (Williams), dwarf cherry stocks, red currant and blackberry (Thornless Evergreen) are given. Blackberry gave very promising results, but further work is needed on a technique for the other crops.—Inst. Vered. Tuinbouwgew., Wageningen.

1098. de Haas, P. G.
Kann die autovegetative Vermehrung von Obstsorten die Verwendung von Unterlagen ersetzen? **(Can propagation of fruit varieties on their own roots replace the use of rootstocks?)** [English, French and Spanish summaries about ¼ p. each.]
Mitt. Klosterneuburg, Ser. B, 1957, 7: 299-314, bibl. 17, illus.

The author discusses advantages and disadvantages of rootstocks in fruit growing, and also of growing trees on their own roots. With apples no definite advantage of the latter method has yet been established. Methods of propagation for the production of trees on their own roots are described, and it is concluded that work in the nursery is not thereby simplified or reduced.—Inst. Obstb. u. Baumsch., Tech. Hochsch., Hannover.

1099. Schwarz, K. G.
Beiträge zur autovegetativen Vermehrung von Apfelsorten. **(Propagation of apple varieties on their own roots.)**
Gartenbauwiss., 1957, **22**: 297-321, bibl. 51, illus.

Studies on the propagation of apple varieties on nurse root grafts have shown that 4 factors affect the degree of root formation, viz. variety, rootstock, propagation medium and nutrient levels. With Goldparmäne rooting was best when Malling rootstocks were used as nurse roots, while weak seedling stocks promoted better rooting than did vigorous seedling stocks. The most satisfactory rooting media were a mixture of sand (3 parts) and peat (1 part), and Fruhstorfer standard compost. Nitrogen applications at 20 g. per sq. m. improved root formation of nurse grafts by 31·7% with Goldparmäne and by 14·3% with Cox's Orange Pippin; there was only a slight increase with 10 g. P_2O_5 per sq. m., and 30 g. K_2O per sq. m. had no effect on rooting. Ringing or wiring of the shoots also gave an increase in rooting, but application of 0·1% IAA to the basal ends of the shoots had no effect.—Inst. Obstb. u. Baumsch., Tech. Hochsch., Hannover.

1100. Gavrilov, V. G.
Some characteristics of vegetative propagation of the apple variety Čulanovka.
[Russian.]
Agrobiologija, 1957, No. 3, pp. 143-5, illus.

Čulanovka is a slow growing, productive, frost resistant apple variety suitable for the northern fruit growing areas of Russia. Of methods of propagation tested stooling was found to be the most suitable, and the best results were obtained when the plants were mounded first with peat and then with soil.

1101. Snyder, L. C., Alderman, W. H., and Weir, T. S.
The effect of interstock and scion varieties on the rate of growth and earliness of fruiting in double worked apple trees.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 1-4, bibl. 10.

The interactions of 7 interstocks and 8 scion varieties were studied over a period of 8 years. The interstock Minnesota 790 produced the strongest growth of scions, followed by Prairie Spy. Fireside, the most vigorous scion variety, made a very poor interstock for most varieties. The effect of scion on interstock was even greater than that of interstock on scion. Yields of scions budded on Dolgo Crab. Minnesota 790 and Anoka interstocks were significantly higher than those on Van Buren, Prairie Spy or Fireside. Anoka appeared to be particularly promising as an interstock except where Anoka scions were used.—Inst. Agric., Univ. Minn.

1102. Preston, A. P.
Apple rootstock studies: thirty-five years' results with Lane's Prince Albert on clonal rootstocks.
J. hort. Sci., 1958, **33**: 29-38, bibl. 15, illus.

The growth and cropping of Lane's Prince Albert apple on 22 different clonal rootstocks, up to the age of 35 years, are reported. Trees on M.IX, M.VII, M.IV, M.II, M.I and M.XVI are dealt with in detail. Tree size, based upon area of trunk cross-section and branch height and area of spread measurements, showed that the 6 rootstocks fell into 5 vigour groups: M.IX, dwarfing; M.VII, semi-dwarfing; M.IV, moderately vigorous; M.II and M.I, vigorous; M.XVI, very vigorous. The relative order for tree size on the 6 rootstocks was established by the fifteenth year and that for cropping by the twentieth. Shoot growth decreased when the trees became overcrowded during the war period but it increased after the trees were thinned. Trees on the dwarfing M.IX yielded the heaviest accumulated crop per tree during the early years, but they were superseded by trees on the moderately vigorous M.IV by the tenth year. By the fifteenth year, trees on the vigorous M.I had yielded the heaviest accumulated crop and it was not until the twentieth year that these were surpassed in cropping by the largest trees, viz. those on the very vigorous M.XVI. The heaviest annual yield was recorded at thirty-three years of age for trees on M.IX and M.II and at twenty-seven years for trees on M.IV, M.I and M.XVI. Trees on M.VII yielded their heaviest crop at sixteen years of age. The yields are discussed in relation to tree size and spacing. On an acreage basis the small trees on M.IX, at 12 feet apart, had much heavier estimated yields than the large trees on M.XVI, at 24 ft. apart, during the first two ten-year periods. During the last ten-year period, however, the reverse was the case. [From author's summary.]—E. Malling Res. Stat., Kent.

1103. Statens Forsøgsvirksomhed i Plantekultur.
Forsøg med forskellige grundstammer til kirsebaer. **(Cherry rootstock trials.)**
Erhvervsfrugtavl., 1958, **24**: 115-16.

In 20 years' trials with 4 cherry varieties East Malling F12/4, F5/1 and F2/1 proved superior to various seedling rootstocks.—Blangstedgaard. F12/1 was not in the test.

1104. Petrosjan, A. A.
Biological characteristics of sucker formation in plums. [Russian.]
Agrobiologija, 1957, No. 3, pp. 139-43, illus.

In Moldavia the important local plum varieties Vengerka moldavskaja, Goldan and Berdaka propagate themselves by root suckers. The suckers develop from special roots, which are longer and darker than the ordinary feeding roots, do not or only rarely branch, and grow at a depth of 25–35 cm. These roots grow out from the root neck or close to it, feed the daughter plant until it develops its own feeding roots and then cease growth, but are kept alive by the mother plant. Old plum orchards are constantly rejuvenated by suckers and their use for establishing new orchards is recommended, as trees of the varieties mentioned live longer and are more productive when propagated from suckers than when grafted. Not more than 5 sucker plants from each selected mother plant should be taken in one season, and these should be grown in the nursery for 1 or 2 years.

1105. Wierszyłłowski, J., and Katulska, C.
Porównanie dwóch metod przedsiewnego traktowania kiełkujących nasion ałyczy (*Prunus divaricata*). **(A comparison of 2 methods of treatment of germinated seeds of *Prunus cerasifera* var. *divaricata*.**
[English and Russian summaries $\frac{1}{2}$ p. each.]
Roczn. Nauk rol., Ser. A, 1957, **76**: 323-34, bibl. 7, illus.

The treatments used at the Poznan Agricultural College to induce root branching and thereby eliminate pricking out were soaking in growth substances and breaking of the tips of roots. Both methods were effective but the best results were obtained when the germinated seed was soaked in 25–50 p.p.m. potassium salt of α-NAA for 6 hrs. A similar treatment with 2,4-D proved harmful.

1106. Doran, W. L., and Bailey, J. S.
Vegetative propagation of beach plums.
Nat. hort. Mag., 1957, **36**: 349-52, bibl. 6.

Beach plum (*Prunus maritima*) has been successfully propagated by root cuttings and by softwood stem cuttings. Hardwood stem cuttings gave poor results. Softwood cuttings rooted best when taken between June 15 and July 15. Rooting was improved by powder-dip or solution-immersion treatment with IBA. The survival and growth of root cuttings was better when they were made from roots $\frac{1}{4}$–$\frac{1}{2}$ in. in diameter than from larger roots, and better results were obtained with younger than with older plants. Root cuttings did not respond to treatments with IBA or NAA. The best regeneration was obtained with root cuttings planted vertically with the upper end above the surface of the rooting medium.—Mass. agric. Exp. Stat., Amherst.

Growth and dormancy.

(*See also* 1169j, k, 1170, c, i, 1224.)

1107. van der Boon, J., and Butijn, J.
Relatie tussen de ouderdom van een appelboom en zijn afmetingen en opbrengst. **(The relationship between the age of an apple tree and its size and yield.)** [English summary $\frac{1}{4}$ p.]
Meded. Dir. Tuinb., 1958, **21**: 35-9, bibl. 2.

Growth and yield of Jonathans on M.XVI growing in sea clay were related to age between the 7th and 17th years. The relationship between trunk girth, crown spread, yield and age could be statistically expressed in rectilinear form. The relationship between yield, as a function of crown spread, and age was found to be curvilinear.

1108. Batjer, L. P., and others.
Predicting harvest size of apples at different times during the growing season.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 46-57, bibl. 1, illus.

With a view to developing a quantitative method of predicting harvest size of fruit early enough in the season to be a useful guide to thinning practices, measurements of tagged Winesap and Delicious apples were made at intervals from 35 days after full bloom to harvest over a period of 8 years [see also *H.A.*, 24: 2285]. The data showed a close correlation of size at different times during the growing season with harvest size. They also showed that the later the prediction the greater was the accuracy; acceptable accuracy (75–80%) was obtained as early as 50 days from full bloom. Prediction was also considerably more accurate with large than with medium or small fruits. It is emphasized that forecasting fruit size is only valid in an area having fairly uniform growing conditions from year to year.—Agric Res. Serv., U.S. Dep. Agric., and Wash. St. Coll., Wenatchee.

1109. Maggs, D. H.
The growth of scions under conditions of extreme vigour.
Ann. Bot. Lond., 1957, **21**: 539-54, bibl. 22, illus.

In order to ascertain growth-rates of scions free from rootstock limitations, [apple and plum] shoot-and root-scions were induced to grow very rapidly by grafting them on to heavily pruned rootstocks. Under these conditions the growth-rates of shoot-scions did not follow the same order as the root-scions of the same varieties; the growth-rates of root and shoot scions relative to one another were in accordance with the hypothesis that the growth-rate of a composite tree was the resultant of the growth-rates of its component varieties. *Varietal* differences in shoot weight were attributable largely to differences in the proportion of leafage on the shoots, average increments in shoot weight per gram of leaf being nearly the same for all varieties; *within* varieties, the lighter shoots had less increment per gram of leaf than the heavier, despite, in some cases, a higher proportion of leafage. [Author's abstract.]—East Malling Res. Stat., Maidstone, Kent.

1110. Sergeev, L. I., Bajkov, G. K., and Sergeeva, K. A.
The vernalization phase of woody plants. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1957, **116**: 510-13, bibl. 14, illus.

In experiments in Baškiria it was found that flower buds and vegetative buds of 3 apple varieties broke after the trees had received an 84-day and a 114-day period, respectively, with a midday temperature not exceeding 10° C. The chilling requirements of both vegetative and flower buds of a cherry variety and *Amelanchier* were 54 days, those of *Prunus chamaecerasus* 84, and gooseberry and black currant 114 days. Terminal buds had a lower chilling requirement than the others. When the internal factors associated with dormancy were studied it was noted that the accumulation of glucose and other water-soluble sugars in the flower buds was slow, and that during chilling the isoelectric point of the protoplasm was lowered.

1111. Nesterov, Ja. S.
Dormancy and hardiness in fruit trees. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1957, **117**: 507-10, bibl. 10.

Plants indigenous to the north usually have a shorter dormant period than those from the south. The hardiness of fruit trees depends to a large extent on the length of dormancy and weather conditions in winter. When *Malus* spp. with different lengths of dormancy were studied the most hardy species of northern origin, *M. pallasiana* and *M. manshurica* with short dormant periods were found to be frost damaged during a variable winter, while other species, *M. sieboldii*, *spectabilis*, *arnoldiana* and *prunifolia* with longer dormancies, were unaffected. During a continuously hard winter the former species, in spite of having completed their dormancy, could not start early growth because of the low temperature and were not frost damaged, whereas the others were injured. Similar results were obtained with pear and plum in tests which included cultivated varieties. It is suggested that the length of dormancy should be considered when introducing fruit varieties into new areas and also in breeding.

1112. Donoho, C. W., Jr., and Walker, D. R.
Effect of gibberellic acid on breaking of rest period in Elberta peach.
Science, 1957, **126**: 1178-9, bibl. 5.

Young peach trees that had been exposed to only 164 hours of chilling temperature were induced to leaf out by 2 spray applications of gibberellic acid at 200–4,000 p.p.m. Concentrations below 200 p.p.m. were ineffective in breaking dormancy. Trees exposed to 433 hours of chilling temperature (about half the normal requirement) were induced to break dormancy by 4 applications of 100 or 200 p.p.m. gibberellic acid. Peach seed that had been stratified for only half the usual length of time was soaked for 24 hours in 0–1,000 p.p.m. gibberellic acid. Treatment with 100 or 200 p.p.m. caused a much higher percentage of seed germination and greater seedling growth than no treatment; higher concentrations inhibited germination and growth.—N.C. St. Coll., Raleigh.

1113. Bradley, M. V., and Crane, J. C.
Gibberellin-stimulated cambial activity in stems of apricot spur shoots.
Science, 1957, **126**: 972-3, bibl. 4, illus.

Scaffold branches of Royal apricot were sprayed in April with gibberellin at 1,000 mg./l. Five weeks later treated spurs were compared microscopically with untreated controls. In the treated spurs there was a great increase in radial diameter and in number of cells along the radius of the xylem cylinder, particularly along the xylem rays, indicating that gibberellin stimulated division in cells of the cambial zone. Gibberellin had little or no effect on cell number in the phloem. Long shoots on which terminal buds were still active at time of treatment responded by increased longitudinal, but not lateral, growth. Treatment did not break the dormancy of spur buds and even retarded their development. It is suggested that gibberellin might have influenced differentiation indirectly but affecting polarity of cambial division. Alternatively and more probably, it might have merely exaggerated the growth pattern occurring at the time of treatment.—Univ. Calif., Davis.

Pollination.

(*See also* 1170 l, 1310.)

1114. Zaec, V. K., and Sedov, E. N.
The effect of conditions of growth on the selectivity of fertilization in apples. [Russian.]
Agrobiologija, 1957, No. 3, pp. 67-71.

(1) When an apple variety on a given rootstock was pollinated with the same variety on other rootstocks the fruit set was better and the number of viable seeds in the fruits greater than when pollinated with the same variety on the same rootstock. The best results were obtained with open pollination. (2) Varieties which were suitable pollinators for trees on their own roots were also suitable for the same varieties grown on rootstocks. (3) In 5 apple varieties out of 7 the addition of pear pollen to their own pollen gave a higher percentage of fruit set than their own pollen alone. In all 7 varieties open pollination resulted in the best fruit set, highest number of normal seeds and largest fruits. The pear variety Mičurin's Bere Zimnaja was self-sterile, but the addition of apple pollen to its own pollen gave 1·5% fruit set.

1115. Griggs, W. H., Iwakiri, B. T., and Claypool, L. L.
A comparison of growth, maturity, and quality of seedless and seeded Bartlett pears.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 74-84, bibl. 7.

Under the conditions of this experiment—an orchard that normally produces high yields of fruit with relatively low soluble solids and flavor acceptance—it is concluded that there are no commercially important differences in the quality, as measured by soluble solids and flavor acceptance, between seedless [naturally parthenocarpic] and seeded Bartlett pears. Seedless pears have a more desirable shape as evidenced by consistently greater length-to-diameter ratios but are a few days behind seeded ones in degree of softness and soluble solids accumulation. [From authors' summary and conclusions.]—Univ. Calif., Davis.

Soil management.

(*See also* 1065.)

1116. Essex Institute of Agriculture.
Soil and water problems in fruit growing.
Tech. Publ. Essex Inst. Agric., Writtle, 1957,
pp. 31, bibl. 3, 2s. 6d.

This booklet summarizes 5 lectures given to fruitgrowers on the following aspects: The plant and its water supply, by R. H. Stoughton; Soil structure and soil water, by B. S. Furneaux; Manuring in the light of recent research, by C. Bould; Grassing down and related practices, by D. W. P. Greenham; and The irrigation of fruit crops, by J. E. Goode.

1117. Bittner, C. S.
Ecological factors in relationship to the deterioration of peach plantings as evidenced by a study in Ottawa county, Ohio.
Diss. Abstr., 1957, **17**: 1436-7, being *Publ.*
21,467 of 142 pp.

Ecological factors found in peach orchards in 4 districts were evaluated. The choice of a site which originally supported forest trees that approached the beech-maple complex contributed to successful peach growing, as did also the selection of a soil site that exhibited great non-capillary porosity and provided adequate water movement to insure tree longevity. Factors evaluated which were inconclusive or negative included water levels and root distribution.—Ohio St. Univ.

1118. Chippindale, H. G.
Studies of orchard swards: a progress report.
Exp. Hort., 1957, No. 1, pp. 17-27, bibl. 5.

Results are reported of observation studies and commercial trials carried out by the N.A.A.S. in a number of apple and pear orchards in the South-eastern Region. The behaviour of different species of grass and clover is noted, with incidental references to tree growth and fruiting.

1119. Jones, J. L.
It's the mixture that matters.
Fmrs' Wkly, 1957, **47**(11): 93, illus.

Trials at Long Ashton Research Station suggest that a timothy/white clover mixture is the best for grassing down an apple orchard in the early years, a blend of 8 lb. S.50 and 2 lb. S.184 being recommended. Perennial ryegrass and timothy alone competed strongly with the trees for N. Trees on frequently mown tumbledown plots were almost as vigorous and productive as those on S.184 sward.

1120. Eggert, R.
The effect of cover crop management on soil moisture in a young apple orchard.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 21-6,
bibl. 7.

Failure to mow grass (mainly *Poa compressa*) cover in early June resulted in rapid depletion of available water at both 12 in. and 30 in. depths during 2 growing seasons (June and July 1951 and 1952). When the grass cover was mown in early June and left in place, the start of second growth was delayed and moisture at both depths was conserved more effectively early in the season than when the mowings were removed. In plots in which the mowings were not removed, soil water decreased rapidly approximately 2 weeks after the second mowing, especially at the 12 in. level.—Univ. New Hampshire, Durham.

1121. Pesserl, G.
Untersuchungen über den Nährstoffgehalt der Böden im ober- und niederbayerischen Obstbau und die sich daraus ergebenden Folgerungen für die Obstbaumdüngung. **(Studies on the nutrient contents of Bavarian orchard soils and their bearing on the manuring of fruit trees.)**
[*Publ.*] *Obst- und Gartenbauverlag, Munich*,
1957, pp. 16, bibl. 2.

A survey of orchards in Bavaria, where fruit trees are grown in grass sward, showed a serious soil depletion in P and K, with a resulting unbalance in the N : PK ratio. The work was carried out by the Institut für Obstbau, Weihenstephan, in co-operation with the Advisory Service.

1122. Eggert, R., Latimer, L. P., and Percival, G. P.
The uptake of magnesium by different grasses in relation to their use as mulch in orchards.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 10-14,
bibl. 5.

Results on the comparative uptake of magnesium by orchard grass, smooth brome and timothy from three different Mg fertilizers are reported. Under the conditions of this experiment, orchard grass, grown outside the orchard with N and Mg fertilization, when cut before seed was produced and hauled into the orchard before leaching could take place, released a larger amount of Mg on decomposition and leaching than would an equal tonnage of timothy or brome grass. Orchard grass grown as a cover crop in the orchard, when fertilized with N, removed larger amounts of Mg from the soil during the period of rapid tree growth and at a time when the trees in the orchard require this Mg for their own growth. [From authors' summary and conclusions.]—Univ. New Hampshire, Durham.

1123. Kuźniar, K.
Wpływ stosowania rozmaitego rodzaju ściołek w sadach na drobnoustroje glebowe. **(The effect of various mulches applied in orchards on soil micro-organisms.)** [English and Russian summaries 2 pp. each.]
Roczn. Nauk rol. Ser. A, 1957, **76**: 335-67,
bibl. 9.

In a study at Górna Niwa, near Puławy, during 1953–1955 the following mulch treatments were applied in a dwarf apple orchard: peat, sawdust, tarred paper, leaf litter, fallow seeded with legumes in July, sod with the mowings left *in situ* and straw. The results which are set out in detail show that leaf litter, summer-sown legumes and sod had a favourable effect on the development of micro-organisms, nitrification and the occurrence of azotobacter. Peat, sawdust and tarred paper retarded the development of micro-organisms though they did not appear to affect yields. The effect of these treatments on the growth and yield of the trees is to be studied.

Nutrition.

1124. Fritzsche, R.
Düngungsfehler in jungen Obstanlagen! **(Mistakes made in manuring young orchards.)**
Schweiz. Z. Obst- u. Weinb., 1957, **66**: 632-4, illus.

Injury to or death of young fruit trees was often observed as a result of adding fertilizer to the soil at planting or applying it soon afterwards. Other undesirable effects resulted from mixing humus preparations or compost with the soil. Well-rotted stable manure may be used for covering the soil around the tree.

1125. Fisher, E. G., Boynton, D., and Kirkpatrick, J. D.
Diagnosing fruit needs.
Bett. Crops, 1957, **41**(8): 8-14, bibl. 5, illus.

Experience with leaf and soil analyses in orchard diagnostic studies in western New York with apples, pears, grapes and cherries is reported. In a manurial experiment with Bartlett pears K applications increased fruit size and leaf K contents. In sour cherry studies it was shown that tree vigour and fruit size were more dependent on the level of K nutrition than on any other variable.

1126. Saint-Gobain.
La fumure du pommier en vergers intensifs. **(Manuring of apple trees in intensively cultivated orchards.)**
Saint-Gobain, 16, Av. Matignon, Paris, 8^e, pp. 56, illus.

Young apple trees (mainly Boskoop) were planted on a poor sandy soil, 10 m. apart, and given a complete fertilizer supplemented with various levels of N. During the early stages of growth increases in circumference and shoot length were proportional to increasing N levels, while inflorescence number was reduced at high levels of supplementary N. Yields produced by trees of 8- to 12-years-old were highest at the highest N level (200 kg./ha.). High N reduced fruit colour of Boskoop and Reine de Reinettes, but did not affect Starking Delicious; fruit quality was not affected. Leaf analyses showed that N content increased while P_2O_5 content decreased from spring to autumn with increasing N applications. Content of K_2O remained constant throughout the season; content of CaO and MgO increased during the growing season with increasing doses of N. Leaf C content tended to increase with N doses in the spring, but to decrease in the autumn.

1127. Edgerton, L. J.
Effect of nitrogen fertilization on cold hardiness of apple trees.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 40-5, bibl. 4.

Soil and foliar applications of N were made to Cortland apple trees in autumn and early winter in 3 successive years. Twig and bark samples were then subjected to controlled low temperatures in the laboratory and the extent of cold injury was determined by the electrical conductivity method. Results showed that October and early November applications of N may increase susceptibility of both twigs and bark to freezing. The effect was more noticeable in November and December than in mid-winter. October application of urea as a foliage spray appeared to have less effect on susceptibility to winter injury than ground application of ammonium nitrate. There was no indication that December application of ammonium nitrate was detrimental.—Cornell Univ., Ithaca, N.Y.

1128. Benson, N. R., and others.
Effects of levels of nitrogen and pruning on Starking and Golden Delicious apples.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 27-39, bibl. 32.

Nitrogen fertilizers applied to relatively young apple trees growing with a grass sod cover crop increased shoot and trunk growth. With Starking trees each additional application resulted in more growth. With the Golden Delicious variety the second (3N) and third (4N) rates of application did not result in more growth than the first (2N). In the Starking variety production was increased with the first rate of N fertilization, but the second and third did not increase production further. Golden Delicious production was but little affected by fertilization. Starking fruit size was definitely increased by fertilization, but a medium or high rate did not result in larger sizes than did a low rate. The effect of fertilization on fruit size was not so definite in the Golden Delicious variety, but in some years the unfertilized trees seemed to produce the smallest fruit. N fertilizers delayed color development and harvest maturity. Neither length of shoot growth nor yield was highly correlated with nitrogen content of leaves. Pruning had relatively little effect on the growth, yield or quality of fruit produced on young Starking or Golden Delicious trees. With increasing severity of pruning, slightly less fruit was produced; but these fruits tended to be slightly larger in size. [From authors' summary and conclusions.]—Tree Fruit Exp. Stat., St. Coll. Wash., Wenatchee.

1129. van Dam, J. G. C.
Een proef met ureumbespuiting op appel. **(An experiment with urea sprays for apple.)**
Fruitteelt, 1957, **47**: 958-9.

Cox on M.IX were given up to 4 urea sprays at 1- to 3-week intervals starting from petal fall. Untreated trees showed N-deficiency symptoms. Fruit set and total yields were increased by urea sprays in relation to the number of sprays given. No effect was observed on average fruit weight, but fruit colour was poor in treated trees. Leaf colour was improved and leaf N content increased by urea applications.

1130. Kolesnikov, V. A.
The uptake of labelled phosphorus from superphosphate by apple trees as affected by the method and depth of application.
[Russian, with English summary 12 lines.]
Izv. Timiryazev. seljsk. Akad., 1957, No. 3, pp. 213-23, bibl. 9, illus.

Of 4 methods of application tested superphosphate watered into holes, 30-40 cm. deep, around 16- to 17-year-old apple trees resulted in the greatest and most rapid uptake of P^{32}, maximum root and shoot growth and heaviest foliation. The flowers were found to contain more P^{32} than the leaves on the same branch, and the younger fruit spurs more than the older ones.

1131. Wilkinson, B. G.
The effect of orchard factors on the chemical composition of apples. II. The relationship between potassium and titratable acidity, and between potassium and magnesium, in the fruit.
J. hort. Sci., 1958, **33**: 49-57, bibl. 9.

In fruit of Cox's Orange Pippin from a fertilizer experiment and of Laxton's Superb from a cover crop trial it was observed that increasing K concentration was closely associated with increasing acidity. K and Mg concentrations in the fruit were also positively associated, and this may partly explain why heavy K applications tend to cause Mg deficiency elsewhere in the plant.—Ditton Lab., D.S.I.R. [For Part I see *H.A.*, 27: 2163.]

1132. Marais, P. G., van Niekerk, P. E. le R., and Smit, W. B. de V.
Radio-active isotopes supply new information to agriculturists.
Dec. Fruit Gr, 1957, **7**: 199-203, illus.

Young apricot plants in pots were found to absorb a considerable amount of P^{32} at the end of the growing season, but practically none when the trees were coming into bud or when new fruit was being formed. Lupin and rye cover crops were shown to be readily-available sources of phosphate.—W. Prov. Fruit Res. Stat., Stellenbosch.

1133. Ambarcumjan, M. A.
The effect of mineral fertilizers on flower bud formation and frost resistance in apricots under irrigation conditions in the Oktemberjansk region. [Russian.]
Izv. AN Arm.SSR, biol. i s.-h.n., 1955, **8**(5): 17-26, from *Ref. Ž. (Biol.)*, 1957, No. 14, Abstr. 60,182.

Application of mineral fertilizers during vegetative bud burst had a favourable effect on the frost resistance of flower buds on young bearing apricot trees. By applying P and N fertilizers flower bud initiation was increased by 43%. Frost damage to flower buds was 58% lower on the fertilized plots than on the non-fertilized ones.

1134. Ogaki, C., Watanabe, T., and Tatsuno, Y.
Experiment on autumn application of manures for peach trees. No. 1. The effects of fertilizers applied in autumn. [Japanese, with English summary ½ p.]
Bull. Kanagawa agric. Exp. Stat. hort. Sect., 1957, No. 5, pp. 27-32, bibl. 3.

The effect of 2 methods of manuring on peach tree growth was studied. Increases in trunk and branch growth and in fruit yields were greater with a single March application of farmyard manure than with applications in November and March of farmyard manure and chemical fertilizers. Fruit drop was less and fruits tended to mature earlier with the double application of manures.

1135. Bucher, R.
Zusammenhänge zwischen Boden-, Dünger- und Pflanzenbor. **(Relationships between boron contents of soils, fertilizers and plants.)** [English and French summaries ½ p. each.]
Landw. Forsch., 1957, **10**: 165-76, bibl. 24.

The hot-water-soluble fraction of B reserves in soils may be regarded as fully available. Plants with high B concentrations in their leaves are to be regarded as having a high B requirement. Threshold values for deficiencies (which are occasionally symptomless) are 0·5 p.p.m. hot-water-soluble B in heavy soils and 0·4 p.p.m. in light soils for grape vine and somewhat less for pome fruits. Heavy soils may be regarded as containing a store of slowly available B, some of which is acetate-soluble. B requirements are greater in heavier soils as these tend to fix some of the B applied, but for the same reason overdoses must be guarded against on these heavier soils as leaching of B is negligible. For such valuable crops as pome fruits, grape vines and hops, more detailed research on latent and acute B deficiency levels is desirable. Hot water extracts can also be useful to indicate B levels toxic to sensitive crops, e.g. apricots or dwarf beans. Drought generally aggravates B deficiency. [From author's summary.]

Pruning.

(*See also* 1169f.)

1136. Monin, A., and Dermine, E.
Contribution à l'étude de la taille de formation du pommier. **(A contribution to the study of pruning young apple trees.)**
Fruit belge, 1957, **25**: 180-5, illus.

Young trees of Golden Delicious on M.II were given 3 degrees of pruning, and the effect on shoot growth was observed. In severely-pruned shoots the increase in shoot diameter was relatively less than that of unpruned shoots, while the increase in shoot length was the greatest following any treatment. The combined length of first- and second-year wood was greater after no pruning than after severe pruning. Severe pruning stimulated branching more than did moderate or no pruning. It is suggested that light pruning during the first years after planting would result in the most satisfactory development of vigorous trees.—Stat. Amél. Plantes fruit. maraîch., Grand Manil.

1137. Bartram, D.
Detail pruning boosts quality.
West. Fr. Gr, 1958, **12**(1): 23, illus.

In an experiment on eighteen 51-year-old Winesap apple trees "detail" pruning, in which 50% of the fruit spurs were removed in addition to the normal pruning and thinning of the fruit, resulted in a good crop, of which 80% were of the best quality; whereas from trees on which only normal pruning and fruit thinning had been carried out only 64% of the crop was of the best quality. J.R.L.

1138. Kolomiec, I. A.
The physiological action of pruning. [Russian.]
Sad i Ogorod, 1957, No. 12, pp. 34-6, bibl. 1.

Results of chemical analyses of the leaves and branches of pruned and unpruned apple trees show that the physiological action of severe and rejuvenating pruning consists mainly in the improvement of the water regime of the plant. During hot and dry days the water supply of the aerial parts, including the growing points, of pruned trees is higher than that of unpruned trees;

this results in reduction of cell sap concentration, better use of minerals, in particular nitrogenous substances, and improvement in photosynthesis, oxidising processes and metabolism. Hence pruning leads to more intensive and prolonged growth of branches and to change of fruiting spurs into growth shoots, and it impedes the development of flower buds on many spurs while permitting moderate flowering and fruiting.

1139. Samish, R. M., Tamir, P., and Spiegel, P.
The effect of various dressings on the healing of pruning wounds in apple trees.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 5-9, bibl. 15, illus.

Auxins and traumatic substances, which both stimulate wound healing in nature, and possibly indirectly active substances such as zinc which stimulate the synthesis of directly active compounds such as auxins, were found to be useful in wound dressings. The response of the tissues surrounding the wound depended on their physiological condition, including the position of the branch and the vigour of the tree. Experiments showed that the addition of 1% 2,4-D plus 2% ZnO to a neutral dressing very greatly increased the rate of growth of wound tissue of apple tree pruning wounds, combining growth stimulation with disinfectant properties. This concentration, however, was excessive for apple nursery plants and for stone fruit trees.—Agric. Res. Stat., and Hebrew Univ., Rehovot, Israel.

Training.

(*See also* 1169c.)

1140. Šternberg, M. B., and Kulikova, R. F.
The physiological features of plagiotropic shoots of fruit trees. [Russian.]
Bot. Žurnal, 1957, **42**: 1079-87, bibl. 23.

Fifty shoots of 6-year-old apple trees, variety Antonovka, were bent into a horizontal position and tied down on May 17, and a further 50 shoots on June 26. Compared with corresponding vertical shoots, those bent back on May 17 developed only 73% of the total length, 84% of the number of leaves and 85% of the internodal length. Tables and graphs are given of the carbohydrate and nitrogen contents in the different tiers of leaves at intervals throughout the season, which show that those in the upper tiers of bent shoots had a lower percentage of these compounds and that the carbohydrate : nitrogen ratio was at first lower in the bent shoots but became the highest in the upper tiers of shoots bent on May 17. On the basis of these figures it is suggested that bending the shoots delays and reduces starch production and nitrogen metabolism in the leaves of upper tiers, which age earlier than similar ones on vertical shoots. The translocation of solutes, including growth substances, is discussed with reference to fruiting.

Thinning.

1141. Lalatta, F.
Prove sperimentali di diradamento del pesco S. Anna de Balducci. **(Thinning tests on the peach variety S. Anna di Balducci.)** [English summary 7 lines.]
Ann. Sper. agrar., 1957, **11**: 1095-1125, bibl. 17.

Early fruit thinning of S. Anna di Balducci peaches was strikingly more successful than late thinning in giving high quality fruit and improving production in the following year. A further slight advantage resulted from previous flower thinning with a DNOC product.

Spraying for cultural purposes.

(*See also* 1218-1220.)

1142. Bajpai, P. N., and Thakur, D. R.
Effect of some plant growth regulators on self-incompatibility in loquat *Eriobotrya japonica* Lindl).
Sci. and Cult., 1957, **23**: 321-2, bibl. 2.

Indolenaphthaleneacetic acid and 2,4,5-T applied as pastes and sprays to the flowers of 2 loquat varieties did not increase fruit set. Sprays of IAA, IBA and NAA, all at 0·1%, and of indolepropionic acid (IPA) resulted in from 52 to 69% fruit set, but most of these fruits were seedless and dropped when about pea size. On one variety a few flowers treated with IBA and IPA gave rise to mature fruits, all of which were seeded.—Govt. agric. Coll., Kanpur.

1143. Primer, P. E., and Crane, J. C.
Growth regulator induced parthenocarpy in apricots.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 121-4, bibl. 12, illus.

Parthenocarpic fruit sets of 5 to 15% were obtained in 3 varieties of apricot by spraying weekly with 2,4,5-T at concentrations of from 7½ to 50 p.p.m. Parthenocarpic fruits had fewer cell layers and smaller cells and as a result their average diameter was only 40% of that of fertilized fruits. [From authors' summary.]—Univ. Calif., Davis.

1144. Zielinski, Q. B., and Garren, R., Jr.
The effect of certain growth regulating substances on fruit set and fruit size in Royal Ann sweet cherries.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 113-18, bibl. 10.

The action of Duraset 20-W (N-meta-tolylphthalamic acid), PCPA (para-chlorophenoxyacetic acid), NOA (beta-naphthoxyacetic acid), NAA (naphthaleneacetic acid) and 2,4,5-T (2,4,5-trichlorophenoxyacetic acid) on the growth of the trees and fruits of Royal Ann sweet cherry has been studied. Spray applications of these chemicals in certain combinations significantly increased both fruit size and fruit set. Fruit weight increases ranged between 0 and 34% over the control. The increases in fruit size resulting from these chemicals were due chiefly to the increase in the size or volume of the pericarp or fleshy part of the fruit. Under the conditions of these experiments, no harmful effects from the sprays containing Duraset 20-W, NOA, PCPA and NAA, applied at low concentrations, were noted on either the fruits or the vegetative parts of the trees. However, when combinations of PCPA and NOA were applied at concentrations over 50 p.p.m. of each chemical symptoms of epinasty and leaf flagging were observed. No increase in fruit cracking or evidence of rough sutures was apparent in any of the treatments. Of the five compounds tested, 2,4,5-T and a combination spray of NOA and PCPA appeared most promising. [From authors' summary.]—Oregon St. Coll.

1145. Harris, R. W., and Hansen, C. J.
Hazards outweigh benefits of 2,4,5-T on French prunes.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 119-20, bibl. 1, illus.

Further experiments on the use of 2,4,5-T for increasing prune size [for earlier work see *H.A.*, 26: 2483 and 3372] showed that although sprays were effective in some orchards they were ineffective in others. Moreover, whenever fruit size was significantly increased much of the fruit was seriously injured. Injury could be external or internal, and appeared as skin cracking, split pits, discoloured areas on the skin or in the flesh near the pit, or gum pockets.—Univ. Calif., Davis.

1146. Bowen, T. J.
Value of 2,4,5-TP as a pre-harvest drop spray in apples at Stanthorpe.
Qd J. agric. Sci., 1957, **14**: 183-8, bibl. 4.

Trials were carried out with 2,4,5-TP as a pre-harvest drop spray on Gravenstein apples. When 2,4,5-TP was applied at a concentration of 50 p.p.m. at or shortly before the commencement of natural fruit fall, pre-harvest drop was reduced to negligible proportions (8·7% as against 25·7% in the case of ANA at the standard concentration of 10 p.p.m.). Observational data suggest that the concentration of 2,4,5-TP could be substantially reduced, if necessary, but such reduction is normally unjustified in view of the variable tree vigour in commercial orchards and other factors. The efficiency of 2,4,5-TP as a pre-harvest drop spray can be largely attributed to its long period of effectiveness (26 days as against 14 days in the case of ANA) and the consequent increased permissible latitude in timing. [Author's summary.]

Composition of tree and fruit.

(*See also* 1061, 1169h, s, v.)

1147. Kessler, B.
Effect of transmitted ribonucleic acid from healthy pear trees upon the synthesis and composition of protein.
Nature, 1958, **181**: 201-2, bibl. 8.

In a previous paper [*H.A.*, 27: 1084q] the importance of ribonucleic acid for protein synthesis in fruit trees was demonstrated. In this paper is reported the effect of the acid when transmitted from one tree to another of different physiological age. Ribonucleic acid was extracted from leaves of bearing pear trees on quince at the time of flower bud differentiation and was transmitted to non-bearing trees (of the same age) on pear stock. The treatment markedly affected the nitrogen metabolism in the acceptor tissue. The absorption of total N into the leaves was considerably increased; the total level of protein was increased as well as its percentage of total N. The amounts of the different amino-acids making up the leaf protein were greatly affected by treatment, *isoleucine* in particular being increased. Of special interest was the appearance of *nor*leucine and kynurenine. Treatment with ribonucleic acid which had been inactivated by boiling had no effect, indicating that increase in protein synthesis was the result of biological activity. It is suggested that there may be a similarity between the effects of normal and viral ribonucleic acids.—Agric. Res. Stat., Rehovot, Jerusalem.

1148. Asselbergs, E. A. M.
Studies on the formation of ascorbic acid in detached apple leaves.
Plant Physiol., 1957, **32**: 326-9, bibl. 15.

In the present study, D-glucuronolactone caused a significant increase in ascorbic acid content of detached apple leaves after 24 hours at 1,700 ft.-c. After 48 hours no significant increase was found with any of the experimental substances including D-glucuronolactone, L-gulonolactone, D-galacturonic acid, glucose and fructose when compared with the water control. The high correlation coefficient between ascorbic acid content and leaf area indicated the close relationship between photosynthetic activity and ascorbic acid content in apple leaves. The light sensitivity of ascorbic acid synthesis was confirmed by $C^{14}O_2$ experiments but the results suggest that only certain steps in this synthesis are light sensitive. [Author's summary.]—Canada Dept. Agric., Ottawa, Ontario.

1149. Hayden, R. A.
The nitrogenous constituents of the flowers, fruits, adjacent leaves, and stems of Delicious and Golden Delicious apples, and their relation to fruit setting.
Diss. Abstr., 1957, **17**: 1438-9, being *Publ.* 21,438 of 203 pp.

The reduction of flower number per cluster to minimize competition for nutrients did not appear to be a primary factor affecting fruit set. In Delicious flowers amino N was high at petal fall and low at the first drop stage, while in Golden Delicious the reverse occurred. These variations were considered to be related to fruit setting through their relation to the protein metabolism of the flowers. Translocation and re-utilization within the cluster of N constituents from abscissing flowers was much greater in Golden Delicious than in Delicious. It is concluded that cytological and physiological conditions are more directly related to fruit setting than are nitrogenous constituents.—Ohio St. Univ.

1150. Mehlitz, A., and Matzik, B.
Papierchromatographische Untersuchungen über die in Obstsäften vorkommenden nichtflüchtigen Säuren. **(Paper chromatographic studies of non-volatile acids occurring in fruit juices.)**
Industr. Obst- u. Gemüseverw., 1957, **42**: 127-31, from *Food Sci. Abstr.*, 1957, Vol. **29**, No. 1931.

Details are given of a paper chromatographic method for the detection of non-volatile acids in various fruit juices, and of the use of ion exchangers for the isolation of the acids. R_F values for the acids detected are listed. The juices of apples, quinces, morello cherries, white and red grapes, raspberries, blackberries, lowbush cranberries, bilberries, black elderberries and black, white and red currants were examined, and the occurrence of citric, isocitric, malic, quinic, tartaric, glycolic and phosphoric acids in these juices is stated. In general, the findings confirm those previously established by other workers regarding the presence of malic and citric acids; in addition, the presence of isocitric acid was demonstrated in several kinds of berries, especially in currants. Quinic acid was found in cranberries, as well as in apples and bilberries. Tartaric acid was present only in grapes.

1151. Reynolds, T. M.
Water-soluble constituents of fruit. VI. The amino acids in apricots and peaches.
Aust. J. Chem., 1957, **10**: 198-202, from abstr. in *Food Pres. Quart.*, 1957, **17**: 74.

Both species contained the same 18 amino acids, which were present in similar proportions, except for a lower proline content in peaches.

1152. Devjatnin, V. A.
Vitamins in fruits. [Russian.]
Priroda, 1957, **46**(10): 126-7, bibl. 1.

Figures are given for the vitamin C content of many kinds of fruit. The first place is taken by rose hips with up to 2,000 mg./100 g. fresh weight, and the second by *Actinidia kolomikta* with 1,000 mg./100 g. Vitamin C in 43 apple varieties is shown to vary from 2·5 to 45·6 mg./100 g., while some wild apples contain up to 79·6 mg./100 g. Other vitamins, namely A, B, E and P, are also discussed briefly.

Harvesting and marketing.

(*See also* 1169o, w, 1170g, 2012.)

1153. Rood, P.
Development and evaluation of objective maturity indices for California freestone peaches.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 104-12, bibl. 13.

Objective maturity indices of the maturation process of Redhaven, July Elberta, Elberta, J. H. Hale and Rio Oso Gem peaches were studied during the 1953, 1954 and 1955 seasons. Measurements at harvest ranked in the following order of usefulness in estimating the edible quality of peaches when ripe: pressure-test readings made on both pared cheeks, skin ground colour, flesh colour, chlorophyll content of the flesh, titratable acidity of the juice, and the percentage of soluble solids in the juice. The longer the peaches were allowed to mature and grow until nearly ripe before they were picked from the trees, the better their edible quality when ripe. The length of time after harvest required for marketing peaches before they ripen or soften limits the maturity for shipping peaches. The bases for pressure-test maturity recommendations and for standards for different marketing systems are presented. [Author's summary.]—U.S. Dep. Agric., Fresno, Calif.

1154. Gherghi, A.
Creşterea şi maturarea cireşelor. **(The development and ripening of cherries.)** [Russian and French summaries.]
Comun. Acad. RPR, 1956, **6**(2): 311-17, from *Ref. Ž.* (*Biol.*), 1957, No. 14, Abstr. 60,800.

Experiments at the fruit research station Bystrica in Rumania have shown that the accumulation of dry matter and sugars in the Germersdorfer cherry increases after the appearance of pigment. Quality was found to be affected by annual weather conditions and the position of the fruit on the tree. The best time for picking was when the weight and volume ceased to increase and pigmentation characteristics for the variety appeared.

1155. Walker, W. F., and Fleming, C. P.
Bulk handling of apple and pear crops.
Tasm. J. Agric., 1957, **28**: 325-42, illus.

An account is given of the following methods of bulk handling, with special reference to Tasmanian conditions: transporting the fruit in bulk from the orchard to the packing shed in large bin trailers, with or without their own wheels, and in medium or small bins, which can be lifted by various devices operated independently or by a tractor; and the moving of packed fruit boxes on pallets or in steel mesh crates. J.R.L.

1156. Monahan, W. J.
Revolution in cling handling.
West. Fr. Gr, 1958, **12**(1): 24-5, illus.

This illustrated article describes the bulk handling of cling peaches. The picker places all mature fruit from each tree in a large bin holding about one ton of fruit. The bin is taken by fork-lift trolley to the grading station, where a lid with a spout in it is clamped on the top and the fruit is poured into a water tank. A conveyor belt lifts the fruit from the tank and turns it as it passes sorters who remove the culls. The fruit then passes to another tub containing water, and is held in "flotation" until it can be taken in bulk to the cannery. It is claimed that the fruit is cleaner, fresher and less bruised than with more conventional methods of handling. J.R.L.

1157. Anon.
That inner lining halves the bruises.
Grower, 1957, **48**: 1147.

Bruising of apples packed in wooden boxes was reduced from 17·7% to 8·2% when the boxes were lined with corrugated paper. Bruising was also reduced by looser packs and larger wraps.

Storage.

(*See also* 1169b, d, g, t, y, 1170f, h.)

1158. Blanpied, G. D.
The effect of cooling rate on the market quality of McIntosh apples.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 58-66, bibl. 9.

Before storage at 32° F. McIntosh apples were either hydrocooled to 40° F. or cooled to 32° F. during a period of 3 days or 1, 2 or 3 weeks. During the first 3 months' storage there was an easily discernible difference between all treatments, the hydrocooled fruit being the firmest and the fruit cooled for 3 weeks the softest. After 4 and 5 months' storage the hydrocooled, 3-day cooled and 1-week cooled apples were judged to be about equal, and the 2-week and 3-week cooled apples about equal. After 6 months it was not possible to detect any differences in ripeness and quality between treatments.—Cornell Univ., Ithaca, N.Y.

1159. Smock, R. M., and Sparrow, A. H.
A study of the effect of gamma radiation on apples.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 67-9, bibl. 1.

Gamma radiation (cobalt source) of Rhode Island Greening apples did not lower the respiration rate.

The 40,000 *r* lot had a higher than normal rate. This lot also softened more during the holding period at 74° F. Dosages over 10,000 *r* seemed to aggravate mealy breakdown. Dosages of 20,000 and 40,000 *r* reduced the production of ethylene and volatiles other than ethylene. The respiration rate of Cortland apples was reduced slightly by gamma radiation. Keeping quality of this variety in storage was not affected, except for the 30,000 *r* lot which was slightly softer. Weight losses were not affected by radiation. No commercially important benefits were observed with either variety. [Authors' summary.]—Cornell Univ., Ithaca, and Brookhaven nat. Lab., Upton, N.Y.

1160. Vanwetswinkel, G.
Het melig worden van de appelvariëteit Jonathan. (**Mealiness in Jonathan apples.**)
Cult. Hand., 1957, **23**: 445-6, 474-5.

The effects of pre-storage treatments on the development of mealiness were studied with Jonathan stored at 3° C. and 92% humidity. Mealiness increased with later pickings; it was less common in small fruits than in medium and large fruits. No effect of rootstock was apparent, and no definite results on the effect of tree age have been obtained. The interval between picking and storage did not affect the incidence of mealiness.—Opzoekingsst. Gorsem.

1161. Stevenson, C. D.
Apple cool storage investigations in 1955.
Qd J. agric. Sci., 1957, **14**: 167-81, bibl. 5.

Investigations have confirmed the importance of maturity with regard to the storage life of Granny Smith apples both in normal air storage and in controlled atmosphere storage. As in earlier experiments, the incidence of storage disorders was closely related to the age of the tree from which the fruit was picked. Superficial scald incidence was again closely related to the amount of CO_2 present in the storage atmosphere, but under conditions of high CO_2 concentrations the effect of maturity on the incidence of this disorder was most pronounced. Wastage in fruit picked at the correct stage of maturity was reduced by controlled atmosphere storage and the fruit kept firmer. Delaying the storage of fruit reduced scald incidence but increased wastage from mould and soggy breakdown and resulted in softer fruit. The most satisfactory storage atmosphere was a mixture of 16% oxygen and 5% CO_2. In 1954, when earlier picking dates were used, a mixture of 10% oxygen and 2·5% CO_2 was found to be the most satisfactory, as fruit in this atmosphere did not develop as much scald as in the higher concentration of CO_2. This was the case again for early picks in 1955. However, fruit picked at the later picking date developed less scald and when stored under a 16% oxygen plus 5% CO_2 mixture was firmer than that stored under the 10% oxygen plus 2·5% CO_2 mixture. Ozone-generating ultra-violet lamps did not have any effect on the incidence of storage disorders. [Author's summary.]

1162. Buchloh, G.
Zur Entstehung der Schalenbräune bei Äpfeln. (**The occurrence of scald in apples.**)
Gartenbauwiss., 1957, **22**: 191-207, bibl. 24.

In studies on the origin of scald Ontario fruits were stored either at 4° C. or with an alternating higher temperature, with forced ventilation or in a gaseous mixture. The volatile aromatics produced under conditions of alternating temperature or forced ventilation were the same as those produced by apples stored at a continuous temperature of 4° C. It is suggested that scald is caused by a substance in the skin, which becomes toxic during long periods of low temperature storage, but is diffused from the skin under conditions of alternating temperature or forced ventilation. Gaseous exchange was affected by such conditions, resulting in a reduction in the period of high O_2 uptake, and the attainment of equilibrium soon after storage. Cytochromoxydase activity was not reduced by reducing the O_2 concentration to 5% at the preclimacteric and first climacteric stages, and it is suggested that ferricytochrome-c oxidizes the phenols and polyphenols present in the fruit epidermis. The resulting oxidation products then inhibit respiration by the skin.—Inst. Obstb., Univ. Bonn.

1163. Smith, W. H.
Reduction of low-temperature injury to stored apples by modulation of environmental conditions.
Nature, 1958, **181**: 275-6, bibl. 5.

Bramley's Seedling apples stored at 0° C. were subjected to a 5-day treatment at 15° C. starting at various times during an 18-week storage period. As the date of the warm treatment was deferred there was at first a progressive reduction in the extent and intensity of low-temperature breakdown, but from the 8th week onwards this trend was reversed. Further reductions in both the extent and intensity of breakdown resulted from passing a current of CO_2 and air over the fruit during the warm treatment, the effect being more marked when the CO_2 concentration was 20% than when it was 10%. The effect of the combined warming-CO_2 treatment on the production of volatile substances is being investigated.—D.S.I.R., Ditton Lab., Larkfield. Maidstone.

1164. Pastoriza, R., and Córdoba, O. G.
Temperaturas de congelación de manzanas Deliciosa Común en el curso de su conservación frigorífica. (**Freezing temperatures of Delicious apples during cold storage.**)
Rev. Invest. agric. B. Aires, 1957, **11**: 179-82, bibl. 2.

The apples were commercially ripe when placed in storage at 0–1° C. and 78–82% R.H. Their initial mean freezing temperature was −1·57° C. After 2 months it was −1·71° C. and after 6 months −1·81° C., both being significantly lower than the initial figure. [For similar work on Rome Beauty and Red Delicious, see *H.A.*, 26: 1461 and 27: 1169.]

1165. Pieniązek, S. A., and others.
Przechowywanie jabłek w kopcach. (**Storage of apples in clamps.**) [English and Russian summaries 1 p. each.]
Roczn. Nauk rol., Ser. A, 1957, **76**: 295-322, bibl. 15, illus.

Results of 6-years' storage trials at Skierniewice have shown that weight losses in apples were lower in clamps than in air ventilated common stores, but the incidence of scald was higher. In clamps in which the fruit was stored loosely like potatoes heavy losses due to scald and rotting occurred, but in a newly designed clamp the fruit stored as well as in a common store. This clamp consists of a shallow pit in which boxes of apples, 2 layers only, with adequate gaps for ventilation, are stacked on slats, a slatted roof is built over it to carry the covering straw and soil, and ventilation shafts are provided.

1166. Robinson, D. W.
The barn storage of apples in polythene bags.
Res. exp. Rec. Minist. Agric. Belfast, 1956, 1957, **6**: 65-76, bibl. 13.

Although the degree of control of CO_2 level and injury was limited, the normal keeping life of certain dessert varieties was extended by 4 to 6 weeks by storage in 150-gauge polythene bags with the mouth loosely folded over.

1167. Padfield, C. S.
Waxed paper case-liners reducing wilt and shrivel in Winter Cole pears.
Orchard. N.Z., 1957, **30**(10): 31.

In Winter Cole pears loss of weight and wilt occurrence were reduced by using waxed liners in the boxes. One liner per box reduced wilt from 40% to 8%.

1168. Gac, A.
Contribution à l'étude de l'influence de l'humidité relative et de la vitesse de circulation de l'air sur le comportement des fruits cueillis. **(Contribution to the study of the influence of the relative humidity and of the rate of circulation of air on the behaviour of harvested fruits.)**
Rev. gén. Froid, 1956, **33**: 365-79, 505-31, 613-26, 763-74, 833-43, 963-79, from *Food Sci. Abstr.*, 1957, Vol. **29**, No. 1870.

This work was carried out with Passe-Crassane pears, Calville Blanc apples, Surprise des Halles strawberries and Hamburg Muscat grapes. At a given temperature, loss of water by fruits increased with decreasing humidity and increasing rate of circulation of air. Pears, apples and strawberries lost water even when the air surrounding them was saturated; grapes also lost water in saturated air, after a short period in which they appeared to gain weight. The CO_2 output and rate of maturation of fruits was not affected, or was somewhat increased, by increasing humidity and rate of circulation of air. The flavour and aroma of pears and strawberries were increased in intensity by decreasing humidity and increasing rate of circulation of air; humidity had less effect on apples, and neither variable had much effect on the flavour and aroma of grapes. The rotting of senescent fruits and the growth of yeasts on strawberries were hastened by increasing humidity, and the latter was also hastened by increasing rate of circulation of air. Incidence of bitter pit was not affected by either condition. Loss of weight occurred at a minimum rate at the end of the pre-climacteric period in all the fruits, and this observation might be employed to determine the onset of the climacteric. Pears and apples showed a gradient in water content, which increased from the epidermis towards the core, except that, in apples showing a "glassy" surface breakdown, the surface had a higher water content than the underlying tissues. When the fruits were placed in cold storage, the rate of output of CO_2 decreased rapidly to a minimum that was most marked with high humidity and slow circulation of air; rate of loss of water decreased regularly.

Noted.

1169.

a Alderman, W. H., Wilcox, A. N., and Weir, T. S.
Fruit varieties developed at the Minnesota Fruit Breeding Farm.
Stat. Bull. Minn. agric. Exp. Stat. **441**, 1957, pp. 36, illus.
Descriptions of 42 top fruit, 19 small fruit and 3 ornamental fruit tree varieties.

b Anon.
A new scrubber for apple stores.
Grower, 1957, **48**: 1250-3, illus.
Using a solution of triethanolamine in water.

c Anon.
La haie fruitière Bouché-Thomas. **(A fruiting hedge based on the Bouché-Thomas system.)**
Fruit belge, 1957, No. 194 (Suppl.), pp. 4-7, bibl. 2, illus.
Establishment described with diagrams. [See also *H.A.*, 24: 2083, 25: 2484.]

d Anon.
L'équipement frigorifique des stations fruitières. **(The refrigerating equipment of fruit stores.)**
Arboric. fruit., 1958, No. 48, pp. 5, 9.
Details of the cold storage facilities available in about 60 co-operative fruit stores in France.

e Baldini, E.
Gli sferoblasti del melo. **(Sphaeroblasts on apple trees.)**
Inf. fitopat., 1957, **7**: 322-3, illus.
A brief, semi-popular review. [See also *H.A.*, 26: 3355.]

f Banta, E. S.
Put power into your pruning.
Amer. Fruit Gr, 1958, **78**(1): 24, illus.
Brief notes on and illustrations of mechanical devices for orchard pruning.

g de Beaux, S. A.
Investigation of trial shipment of apples in fibreboard containers.
Fruit World, Melbourne, 1957, **58**(10): 19-23.
Shipment in telescopic cartons within steel mesh containers.

h Bielińska, M.
Studia nad zawartością azotu i węglowodanów w liściach i pędach jabłoni przemiennie owocujących. **(Studies on the nitrogen and carbohydrate contents in leaves and shoots of biennial bearing apple trees.)** [English and Russian summaries 2 pp. each.]
Roczn. Nauk rol., Ser. A, 1957, **75**: 433-520, bibl. 71, illus.
For a shorter account see *H.A.*, 28: 151.

i Courshee, R. J.
Mechanisation of tree food crops.
World Crops, 1957, **9**: 411-13, illus.
New machinery and future developments discussed.

j Davis, L. D.
Flowering and alternate bearing.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 545-56, bibl. 32.
A critical review, with special reference to fruit trees.

k Dermine, E.
La coloration des fruits. (**Fruit coloration.**)
Fruit belge, 1957, **25**: 161-6, bibl. 7.
Factors affecting fruit colour in apples, etc., discussed.

l Drain, B. D.
Fire blight resistant pears in the South.
Fruit Var. hort. Dig., 1957, **12**: 23-4, illus.
Morgan, Carrick and other varieties tested in Tennessee.

m Engledow, R. A.
The grubbing of old farm orchards.
N.A.A.S. Quart. Rev., Winter 1957, No. 38, pp. 179-84, illus.
The problem and programme in Worcestershire.

n Grupšpun, A. S.
The fig in southern Moldavia. [Moldavian.]
Sadov. Vinograd. i Vinodelie Moldavii, 1956, No. 5, pp. 12-13, from *Ref. Ž.* (*Biol.*), 1957, No. 13, Abstr. 55,858.
Grown in prostrate form and covered with a 25-30 cm. layer of soil during winter.

o Hall, E. G.
Pre-packaging fresh fruits and vegetables.
Food Pres. Quart., 1957, **17**: 58-63, bibl. 10, illus.
Problems and methods reviewed.

p Hartman, H.
Catalog and evaluation of the pear collection at the Oregon Agricultural Experiment Station.
Tech. Bull. Ore. agric. Exp. Stat. **41**, 1957, pp. 80, bibl. 7.

q Hobbis, E. W.
Fruit growing in the amateur's garden.
J. roy. hort. Soc., 1958, **83**: 76-82, illus.

r Hough, L. F., and Bailey, C. H.
Two new peaches.
N.J. Agric., 1957, **39**(6): 12.
Short descriptions of Goldgem (NJ 197) and Summerqueen (NJ 157).

s Joux, J.-L.
Sur quelques méthodes utilisées pour l'étude des matières pectiques et des enzymes pectolytiques des abricots et des conserves d'abricots. (**On some methods used in the study of pectic substances and pectolytic enzymes in apricots and apricot preserves.**)
Fruits d'Outre Mer, 1957, **12**: 481-5, bibl. 25.
Laboratory technique used in connection with studies of fruit firmness.

t Kaliappan, R.
Keeping quality of fruits in relation to their maturity when gathered.
South Indian Hort., 1957, **5**: 40-9, bibl. 13.
A review covering temperate and tropical fruits.

u Kolesnikov, V. A.
Work of the Faculty of Fruit Growing during the Soviet period. [Russian, with English summary 3 lines.]
Izv. Timiryazev. seljsk. Akad., 1957, No. 4, pp. 121-30.
At the Timiryazev Agricultural Academy.

v Kott, V.
Testace sklereidnosti hrušek floroglucinovou reakcí. (**Stoniness of pears tested by the phloroglucin reaction.**) [Russian and English summaries ½ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1957, **30**: 963-78, bibl. 12, illus.
Method described.

w Michelsen, F.
Land leveler aids mechanical harvesting.
West. Fruit Gr, 1957, **11**(12): 23, illus.
A machine for orchard soil preparation described.

x Ministry of Agriculture, London.
Commercial varieties of apples and pears.
Adv. Leafl. Minist. Agric. Lond. **343**, revised 1957, pp. 5.
Notes on 9 dessert and 7 culinary apples and 9 pears.

y Morgan, B. H., and Simon, M.
A "short wave" to a longer life for fruits.
Amer. Fruit Gr, 1957, **77**(11): 9, 19.
A brief survey of atomic irradiation responses of apples, cherries, citrus, pears, prunes, raisins and strawberries.

z Moruju, G.
O livadă de meri în vîrsta de 50 de ani. (**A 50-year-old apple orchard.**)
Grădina, via şi- livada, 1956, **5**(5): 70-4, from *Ref. Ž.* (*Biol.*), 1957, No. 15, Abstr. 65,077.
Notes on size and productivity of over 40 varieties in Rumania.

1170.

a Mount, J. W. S.
Quality dessert apples.
Agriculture, Lond., 1958, **64**: 544-8.
The growing conditions which make for quality.

b Neame, B. D.
Quality pears.
Agriculture, Lond., 1958, **64**: 490-3.
Varieties, planting distances, management and marketing.

c Northcote, D. H.
The cell walls of higher plants: their composition, structure and growth.
Biol. Rev., 1958, **33**: 53-102, bibl. 317.
Including Conference pear.

d OBERLE, G. D.
Breeding peaches and nectarines resistant to spring frosts.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 85-92, bibl. 18.
At Blacksburg, Virginia.

e POTTER, J. M. S.
The National Fruit Trials.
Exp. Hort., 1957, No. 1, pp. 12-16.
The development of the new trial ground at Brogdale Farm, Faversham, Kent, and the work of the station.

f ROBERTSON, R. N., AND MARTIN, D.
Apple storage in Australia.
J. Aust. Inst. agric. Sci., 1957, **23**: 183-8, bibl. 12.
A review of research.

g ROWBOTHAM, J. C.
Bulk handling in the orchard.
J. Agric. W. Aust., 1957, **6**: 431-3, illus.
Description and diagrams of trailer for bulk handling of apples.

h SÄKÖ, J.
Havaintoja eräiden syys—ja talviomenalajikkeiden mausta. **(Observations on the taste of certain autumn and winter varieties of apple.)** [English summary ½ p.]
Valt. Maatalousk. Tied. **235**, 1957, pp. 6.
10 varieties maintained high taste values until April.

i SELIVANOVA-GORODKOVA, E. A.
Supporting branches in *Padus racemosa*. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1957, **115**: 1022-4, bibl. 11, illus.
The function of which is similar to that of stilt roots in some tropical trees. [See also *H.A.*, 28: 181f.]

j TETEREV, F. K.
Adapting peaches to northern condition by means of mentors. [Russian.]
Agrobiologija, 1957, No. 3, pp. 72-8, illus.
Of rootstocks tested *Prunus tomentosa* was the most promising.

k TUKEY, H. B.
The fruit areas of America: Michigan.
Amer. Fruit Gr, 1957, **77**(11): 10-11, illus.

l YOKOZAWA, Y., AND YASUI, A.
Studies on the pollination of peach. (I) Insect visitors to the flowers of peach. [Japanese with English summary ¼ p.]
J. hort. Ass. Japan, 1957, **26**: 185-91, bibl. 11.
Hymenopterous and dipterous visitors were the most frequent.

m ZIOBROWSKI, S.
Drzewa owocowe na działce szkolnej. **(Fruit trees in the school garden.)**
Państwowe Zakłady Wydawnictw Szkolnych, Warszawa, 1957, 8×8 in., pp. 105+XVI, bibl. 6, illus., zł. 8.70.
Written for teachers of natural history.

n ZUCCHINI, M.
Il melo in Italia. **(Apple growing in Italy.)**
Ital. agric., 1957, **94**: 1055-64, bibl. 1, illus.
Principal varieties and regional production.

SMALL FRUITS, VINES AND NUTS.

Small fruits.

(*See also* 1073, 1089, 1090, 1097, 1110, 1216f, m, p, r-t, v, 1228, 1545f.)

1171. ŁUCKA, M.
Krzewy i byliny owocowe na działce szkolnej. **(Bush and berry fruits in the school garden.)**
Państwowe Zakłady Wydawnictw Szkolnych, Warszawa, 1957, 8×6 in., pp. 156+XXVIII, bibl. 15, illus., Zł. 9.15.

A description is given of the propagation, cultivation, disease and pest control and varieties of small fruits, vine and hazel. Simple experiments with these crops are suggested. All the varieties mentioned are illustrated by line drawings and 28 of them by additional colour plates. [See also *H.A.*, 28: 1170m.]

1172. ANON.
New Midnite blackberry.
Amer. Nurserym., 1957, **106**(9): 66.

Introduced in Ohio this variety is a regular heavy cropper and has well-formed fruit that ripens over a long season. Cane growth is upright and has shown no sign of winter injury.

1173. HINDLE, R., JR., SHUTAK, V., AND CHRISTOPHER, E. P.
Relationship of wood thickness to blossoming, rate of ripening, and size of fruit on the highbush blueberry.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 150-5, bibl. 6.

Records kept of the numbers of unopened, opened and dropped blossoms on each of 5 blueberry varieties indicated that the sequence of blossom opening is earliest on thin wood, followed by medium and finally by heavy wood. Within the cluster basal blossoms opened first, followed by medial and finally by terminal blossoms. Medial berries, however, were the first to ripen. The sequence of blossoming of the clusters is from terminal to basal. Heavy wood produced the largest berries and thin wood the smallest.—Univ. Rhode Island, Kingston.

1174. BÜNEMANN, G., DEWEY, D. H., AND WATSON, D. P.
Anatomical changes in the fruit of the Rubel blueberry during storage in controlled atmospheres.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 156-60, bibl. 3, illus.

Blueberry fruit harvested at three stages of maturity, defined as hard ripe, firm ripe and ripe, were stored in air and in controlled atmospheres at 32, 40, 50 and 72° F. Acceptable market quality was maintained for 4–6 weeks only at 32° F. Controlled atmospheres retarded breakdown and decay but caused off-flavours due to fermentation. Fruit harvested immediately after obtaining a blue skin colour (hard ripe) stored more satisfactorily than fruit harvested at riper stages. Berries stored at temperatures above 32° F. developed a firm or tough condition which was associated with the development of a corrugated appearance of the walls of the epidermal and hypodermal cells. The corrugation was pronounced in fruit picked ripe and subsequently stored in 5% CO_2 with 2% oxygen at 50° F., less evident in fruit stored in 16% CO_2 and 5% oxygen, and absent in all fruit stored at 32° F. [Authors' summary.]—Mich. St. Univ., E. Lansing.

1175. ANON.
Cranberry blossom blast is not caused by disease.
N.J. Agric., 1957, **39**(6): 8-9.

The number of blossoms which failed to set fruit (blasts) was found not to be associated with disease but to be a normal consequence of overabundant flowering.

1176. COKER, E. G.
The root development of black currants under straw mulch and clean cultivation.
J. hort. Sci., 1958, **33**: 21-8, bibl. 10, illus.

From whole bush excavations of black currants and from root sampling at selected positions, it was concluded that presence of a straw mulch increased the activity of shallow roots and reduced activity of deep roots as compared with clean cultivation. Clean cultivation to 12 cm. deep restricted root growth both in lateral spread and in extension towards the soil surface. From the point of view of root growth, shallower cultivation would have been desirable. [From author's summary.]—E. Malling Res. Stat.

1177. MEHLITZ, A., AND MATZIK, B.
Über Untersuchungen an roten und schwarzen Johannisbeersäften. (**Studies on red and black currant juices.**)
Industr. Obst- u. Gemüseverw., 1957, **42**: 3-5, from *Food Sci. Abstr.*, 1957, Vol. **29**, No. 1932.

In a method for extracting the pigments from the juices of red and black currants, a strongly acid ion exchanger (Levatit S 100) was used for the absorption of the pigments, which were then eluted with ethanolic hydrochloric acid. A chromatographic procedure for the separation of the pigments was next applied, using a mixture of cresol-acetic acid-citrate buffer as solvent. Seven different components were separable by paper chromatography, 3 of which were present in roughly equal amounts, while the remainder occurred in varying but smaller quantities. There were 2 pigment components in red currants which were absent in black currants, while in black currants there were also 2 pigment components which did not occur in red currants.

1178. BRINGHURST, R. S., AND VOTH, V.
Effect of stratification on strawberry seed germination.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 144-9, bibl. 5.

The effects of stratification at 32–34° F. for from 1 week to 8 months were compared on rate and degree of strawberry seed germination. Maximum germination was obtained after 4 months' stratification. Satisfactory germination (50% germinated within 10 days) was obtained after 3 months' treatment, while some lots of seed germinated well after only 3 months.—Univ. Calif., Davis.

1179. YOKOMIZO, T., AND TAKAHASHI, K.
Studies on strawberry forcing. No. 5. Root development in forcing beds and effects of methods of fertilization. [Japanese, with English summary 17 lines.]
Bull. Kanagawa agric. Exp. Stat. hort. Sect., 1957, No. 5, pp. 49-54, bibl. 2, illus.

The root growth of strawberry plants had almost ceased by the middle of December, and began again in late February. Early crops were heavier when the fertilizer was broadcast over the whole root area than when it was placed beneath the plants. Fruit shape and quality were not affected by method of fertilizer placement. [For No. 4 see *H.A.*, 27: 1199.]

1180. BROWN, M. S., AND HITZ, C. W.
An interpretation of the influence of maleic hydrazide upon the growth of strawberry runners based upon radioisotope studies.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 131-43, bibl. 14, illus.

Within a relatively short time after radioactive maleic hydrazide had been applied to mature leaves of Blakemore strawberry plants, the chemical began to accumulate in the runner tips if runner growth was active. The crowns of treated plants, and even the new growth originating from them after treatment, ultimately showed little or no radioactivity. The maleic hydrazide appeared to be incapable of moving against the growth gradient from the runner tip towards a crown or plant already formed. When maleic hydrazide was applied to the leaf of a plant under conditions unfavourable to runner growth and favourable to floral initiation the chemical appeared to concentrate in the crown tip in such quantities as to interfere with blossom initiation.—Univ. Delaware, Newark.

1181. MANN, G., AND CHAPPELL, D. J.
A small scale method of precooling and of transporting precooled soft fruits.
Reprinted from *Mod. Refrig.*, September 1957, pp. 3, illus.

A method of precooling fruit by the use of a simple heat exchanger and solid carbon dioxide is described. An insulated container has been constructed using this system, which is capable of holding 72 1-lb. punnets of fruit.—Ditton Lab., D.S.I.R.

Vines.

(*See also* 1041, 1075, 1135, 1168, 1216a-e, g-l, n, q, w, 2000, 2032, 2036.)

1182. La Hulpe.
Station provinciale de Recherches Scientifiques en Viticulture à la Hulpe. Rapport annuel de 1956. **(La Hulpe Viticultural Research Station, Annual Report for 1956),** 1957, mimeo., pp. 85, illus.

Reports of work in progress include: Reports of pollinations and studies on the hybrids raised; the use of 2,3,5-triiodobenzoic acid and potassium iodide to improve fruit set; biology and control of *Armillaria mellea*; vine growth in various soils; improvement of rooting in old greenhouse soils by soil amendments; control of red spider on vines and peaches, oidium of vines, and scale insects; the use of chromium sulphate to increase sugar content and size of grapes; irradiation to induce polyploidy.

1183. Sisakjan, N. M. (Editor), and others.
The biochemistry of wine-making. Fifth symposium. [Russian.]
Izd. Akad. Nauk S.S.S.R., 1957, pp. 260, bibls, 10 r. 35 k.

Of 19 papers, written by different authors, the following 2 are of viticultural interest: "Biochemical characteristics and technological properties of vine varieties cultivated in Central Asia" (pp. 213-36), in which the suitability of vine varieties for different types of wine is discussed. "The biochemical characteristic of hybrid vine seedlings" (pp. 237-52), dealing with investigations on 11 hybrids in Armenia.

1184. Eidg. Kommission zur Ermittlung der Produktionskosten der Trauben und des Weines.
Der Aufwand an Handarbeit im schweizerischen Weinbau. **(Manual labour requirements in Swiss vineyards.)** [German and French.]
Landw. Jb. Schweiz, 1957, **6**: 597-606.

The report, which is based on information from 230 growers, covers the years 1954 and 1955. It is the first publication of the Commission set up to ascertain production costs of grapes and vines in Switzerland. The enquiry showed that on the average 45·1% of total costs are for manual labour.

1185. Fillipenko, I. M.
Phasic development of vines. [Russian.]
Agrobiologija, 1957, No. 3, pp. 109-17, bibl. 12, illus.

It has been shown by experiments at Mičurinsk that in vine seedlings all phases of development are completed during the first year. The means by which fruiting has been hastened in phasically ready seedlings and bearing achieved in the 2nd–3rd years included: sowing seeds in peat blocks or paper cups in which the seedlings were planted out, followed in the second year by "katavlak" [replanting so that the branches are below soil level], irrigation, manuring, spraying against downy mildew and, most important of all, regular pinching back of shoots and laterals, and pruning.

1186. Nigond, J.
L'action de la température sur le développement et la croissance de la vigne à Montpellier. **(The effect of temperature on growth and development of vines at Montpellier.)**
[*Mimeo.*] *Stat. Bioclimat. agric. Montpellier*, 1957, pp. 20, bibl. 9.

Bud dormancy and shoot growth after bud burst have been studied under controlled and natural conditions at Montpellier. Buds taken during September–November did not all burst during treatment at 25° C., but dormancy of buds taken in December and January was completely broken at 25° C. After a period of controlled low temperature (0° C.) it was shown that the number of days at 18° or 25° C. required before bud burst became fewer as the period of cold treatment lengthened. After natural cold conditions, the time required to break dormancy at 25° C. in buds taken from early September to mid October increased from 43 to 51 days; from mid October there was a rapid decrease in the time to bud-burst until after the beginning in February, when bud growth started under natural conditions. It has been shown by calculation that temperatures between 1° and 8° C. are twice as effective in breaking bud dormancy as temperatures of 0° C. or below. In dormant buds the growth inhibition was stronger at 18° C. than at 25° C. The effect of temperature on rate of growth was much greater after bud burst than before. A delayed effect of dormancy on growth after bud burst was apparent in buds taken during the autumn, but the effect was more prolonged when growth occurred at 18° C. than at 25° C. In studies on the effect of temperature on extension growth of shoots, no growth was observed at 10° C. During the day the rate of growth increased to a maximum at 28° C. after which it decreased. At equivalent temperatures the rate of growth was greater at night than by day.

1187. Breviglieri, N.
Ricerche sulla differenziazione delle gemme e sulla micro e macrosporogenesi nel Sangiovese, nel Canaiolo, nel Trebbiano e nella Malvasia del Chianti. **(Studies on bud differentiation and formation of microspores and macrospores in the vine varieties Sangiovese, Canaiolo, Trebbiano and Malvasia del Chianti.)** [French, English and German summaries approx. 1½ pp. each.]
Atti Accad. ital. Vite 1956, 1957, **8**: 98-129, bibl. 90, illus.

Dates of formation are recorded for flower primordia and floral parts. Development of pollen, embryosacs, fruits and seeds is described in detail.

1188. Branas, J.
Sur l'initiation florale. **(Flower initiation [in vines].)**
Progr. agric. vitic., 1957, **148**: 245-52, bibl. 3, illus.

Along the main branches of varieties of *Vitis vinifera* and *V. labrusca* axillary shoots capable of producing either inflorescences or tendrils formed an interrupted series beginning at the 3rd–5th node. Only the lowest 2 or 3 of these in *V. vinifera* became reproductive. Flower initiation occurred in primordia of lateral but not of apical origin, and was checked to some extent by the presence of existing flowers. A similar sequence of inflorescence and tendril shoots developed from the axillary buds of shoots from accessory (stipular) buds. In dessert grapes, the compactness of the following year's bunches could be increased by heavy pruning of the accessory shoots, but if these were allowed to flower, the considerable reduction of flower initiation and consequently of next season's bunch size provided a natural method of fruit thinning.

1189. KANANADZE, —.
The rate of respiration in different varieties of vine. [Georgian, with Russian summary.]
Tr. In-ta Vinograd i Vinodelia AN Gruz SSR, 1956, **9**: 201-10, from *Ref. Ž.* (*Biol.*), 1957, No. 13, Abstr. 55,804.

The liberation of CO_2 by the leaves, flowers, shoots, roots and berries of different vine varieties grown under shade at 30, 150, 565 and 1,200 m. above sea level in Georgia was studied. The respiration of leaves at the 2 lower elevations was considerably more intensive than at the 3rd elevation, the difference being most marked at full maturity. The rate of respiration was highest before flowering and then gradually declined. The highest rate of respiration was shown by the flowers, then leaves, shoots, roots and finally berries. A rise in temperature from 30 to 40° C. increased respiration; during the first hour at 50° C. it increased and then rapidly decreased. At high temperatures respiration by the roots was higher than that by the leaves. Under identical ecological conditions varietal differences in respiration rates were apparent.

1190. RODRÍGUEZ LÓPEZ, M.
El problema de la rizogénesis en variedades de *Vitis* de difícil enraizamiento. **(The problem of rooting in *Vitis* varieties which root with difficulty.)** [French and English summaries 9 lines each.]
Farmacognosia, 1957, **17**: 289-376, bibl. 105, illus.

Cuttings of vine varieties 41-B, 99-R and 161-49 were treated with various concentrations of β-indoleacetic acid or α-naphthylacetic acid in talc or as solutions. Excellent results were obtained with 24 hours' immersion of the bases in aqueous α-naphthylacetic acid at 150 p.p.m., followed by planting in fine sand under glass at 85–90% R.H. and 17° C.

1191. BREIDER, H.
Frühtestmethoden in der Rebenzüchtung. **(Methods for early selection in vine breeding.)**
Züchter, 1957, 4. Sonderheft, pp. 33-9, bibl. 6, illus.

To shorten the work involved in the production of new vine varieties methods have been evolved of selecting young seedlings for the following characters: Fruit quality, winter hardiness, phylloxera resistance, downy mildew resistance, rootstock-scion compatibility and drought resistance. The methods are described.—Inst. ZüchtForsch. Bayer. Landesanst. Gartenb.

1192. CAMPBELL, R. W., AND GHOSHEH, N.
Hardiness studies of selected grape varieties.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 161-4, bibl. 10, illus.

Electrical conductivity tests showed that canes and rooted plants of the French hybrid varieties Bertille Seyve 2862, Bacol 1, Seibel 5860, Seibel 15062 and Seyve Villard 14287 were equivalent to Concord in hardiness.—Kansas St. Coll., Manhattan.

1193. TURECKAJA, R. H.
The effect of growth stimulants and external factors on overcoming polarity in vine and cherry cuttings. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1957, **116**: 699-702, bibl. 13, illus.

1. Satisfactory rooting was obtained at the apical end of soft wood cuttings of vine after this end had been soaked for 15 hours in 200 mg./l. heteroauxin, and of cherry soaked in 25 mg./l. IBA. 2. When parts of shoots before cutting or planted cuttings were shaded with a black cloth no effect was observed with cherry, but with vine it stimulated the rooting of growth-substance-treated cuttings. 3. Storing cuttings for 5 days at 5° C. before planting had a similar effect to shading. 4. When cherry cuttings 4, 8 and 12 cm. long were treated with IBA, only the longest rooted at the apical end.

1194. CAPRIA DE FLEITAS, H., AND VEGA, J.
Influencia de procedimientos culturales en el arraigo de estacas de porta-injertos vitícolas. **(Effect of cultural practices on the rooting of cuttings of vine rootstocks.)**
Rev. Invest. agric. B. Aires, 1957, **11**: 219-26, bibl. 8, illus.

Rooting was hindered, rather than promoted, by bruising the base of cuttings with a spiked mallet. Cuttings 1·2 m. long, taken in mid winter, rooted better than shorter ones and better than those taken at leaf fall or in early spring. Cuttings 40 cm. long rooted much better when placed vertically in previously watered furrows and completely earthed over than when placed in unwatered furrows, obliquely with or without earth cover or vertically with earth cover. The varieties 420-A and Rupestris du Lot showed the most consistent responses to the different treatments.

1195. CARLONE, R.
Ricerche sulle possibilità d'impiego della paraffina nell'innesto al tavolo della vite. **(Investigations on the possibilities of using paraffin wax in the bench grafting of vines.)**
Reprinted from *Ann. Accad. Agric. Torino*, 1955-1956, Vol. **90**, pp. 33, bibl. 8, illus.

Success depended greatly on using a paraffin wax with a melting point of 52–54° C., free from unsaturated hydrocarbons. Addition of a plasticizing agent such as polyisobutylene was an advantage. The best temperature for dipping was 70° C. or slightly higher, and a dry surface was essential. Under such conditions, grafted cuttings, which had previously been forced showed a 91·6% take in the nursery without earthing up, compared with 81% without paraffin and 61% in unforced, paraffined, earthed-up cuttings. Paraffin wax alone was insufficient protection for unforced grafted cuttings.

1196. OPREAN, M., AND OTHERS.
Experiențe cu altoirea vițelor pe baza butașilor de portaltoi. **(Trials on vine grafting.)**
Grădina, via și livada, 1956, **5**(4): 51-4, from *Ref. Ž.* (*Biol.*), 1957, No. 15, Abstr. 65,107.

In Rumania grafting vines on the morphologically basal end of the rootstock resulted in better union. Grafted by this method Italian Riesling on Kober 5BB gave 91·3% take, while by the old method the take was 54%.

1197. POLSINELLI, M.
Risultati di alcuni anni di osservazioni effettuate su un gruppo di 140 vitigni portinnesti. **(Results of several years' observation on a group of 140 vine rootstocks.)**
Riv. Vitic. Enol., 1957, **10**: 358-65.

The rootstocks are classified according to vegetative vigour, maturation of wood, and resistance to downy mildew and to phylloxera.

1198. SUBBOTOVIČ, A. S.
Fertilizing vine grafts at the time of planting in the nursery. [Russian.]
Sadov. Vinograd. i Vinodelie Moldavii, 1956, No. 2, pp. 50-2, from *Ref. Ž.* (*Biol.*), 1957, No. 15, Abstr. 65,113.

N, P and K applied at 15 or 30 kg./ha. of active principle, at the time grafted vines were planted, reduced the output of transplants from the nursery, but a 7 kg. rate of each fertilizer increased the number of saleable plants. Application of 1 ton/ha. of compost had a favourable effect on growth as did that of B, Zn, Mn and Mo.

1199. SMITH, C. B., FLEMING, H. K., AND POORBAUGH, H. J.
The nutritional status of Concord grape vines in Erie county, Pennsylvania, as indicated by petiole and soil analyses.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 189-96, bibl. 7.

In a survey of 30 vineyards distinct symptoms of Mg deficiency appeared in 5. The diagnosis was confirmed by the very low Mg concentrations in the petioles (0·01–0·13%). This low absorption was strongly correlated with high soil acidity and high absorption of K. The high soil acidity was strongly associated with high Mn content. Symptoms of K deficiency appeared in one vineyard, the diagnosis being confirmed by the very low K content of the petioles; in this case the Mg level was very high and the Mn level very low. The interrelationships between soil analyses values and petiole concentrations were complex.—Pa St. Univ., University Park.

1200. KOZMA, P.
Action du système de taille (charge) et du nombre des feuilles sur le pouvoir de fonctionnement des fleurs de la vigne. **(Effect of the method of pruning and the number of leaves on the functioning capacity of vine flowers.)** [English and Russian summaries 1 p. each.]
Acta agron. hung., 1957, **7**: 175-200, bibl. 4.

During 1950–1955, at the Viticultural Research Institute, Miklóstelep, vine varieties were subjected to different degrees of pruning and, 2–3 weeks before flowering, of defoliation. A negative correlation was found between the number of buds left after pruning and leaves after defoliation, and the development of the stamens compared with the pistil. The author considers that this "masculinization" of the flowers by severe pruning may have been the cause of the production of monoclinous flowers and that nutrition affected this process. It is suggested that the results of this study may enable pruning methods to be developed which will counteract defects in the reproductive organs of certain vines.

1201. ZAVGORODNIJ, A. F., SEREDA, G. T., AND BABENKO, G. N.
A system of pruning vines. [Russian.]
Agrobiologija, 1957, No. 4, pp. 154-6.

In experiments in the Krasnodar region on the vine varieties Murveder and Krestatyj all fruiting shoots, with the exception of replacement wood, were cut back to 3–4 leaves above the last inflorescence before flowering. Contrary to normal practice unproductive shoots were not removed. As a result flowering and ripening were advanced, formation of laterals retarded, incidence of downy and powdery mildews greatly reduced and yields were almost trebled.

1202. GALLAY, R., LEYVRAZ, H., AND SIMON, J.-L.
Faut-il modifier nos méthodes traditionnelles de culture de la vigne pour réduire les frais de production? **(New methods to cut vine production costs?)**
Rev. romande Agric. Vitic., 1958, **14**: 1-12, illus.

Some modifications in viticultural operations have shown promise in reducing production costs. A simplified method of defoliation has reduced the time required compared with the traditional method, and has produced higher yields than no defoliation. Three methods of training have been tested and are discussed. With the Lenz-Moser system vines are slow to come into bearing, while high yields were obtained with Guyot-trained vines planted at 1·1 m.×0·8 m. For some varieties the permanent cordon system is preferable to the Guyot.

1203. PASTORE, F.
Il tendone. **(A trellis system [for vines].)**
Riv. Vitic. Enol., 1957, **10**: 351-7, 383-92, illus.

This comparatively new system for growing dessert grapes was first established on the calcareous soils of Apulia. Soil preparation is described and suitable rootstocks are listed. Vines are trained to a height of 1·8–2 m. and a framework is essential, the construction of which is described and clearly illustrated. Chestnut poles are recommended. The best shoot of each young vine is trained horizontally, all are trained in the same direction along the "ceiling" wires and fruiting is checked until a thick canopy is formed. Laterals are kept strictly to alternate development. In warm regions each vine is cut down annually to one basal spur of 2–3 buds. Regina (Pergolona) is a variety responding well to this training system. Economic details are given for the first 3 years. Production is highest in the 10th–25th year period, reaching 300–400 kg. per ha. in Bari.

1204. ANTCLIFF, A. J.
2,3,4-Trichlorophenoxyacetic acid as a spray to replace cincturing of currants.
J. Aust. Inst. agric. Sci., 1957, **23**: 242-3, bibl. 3.

Bunch weight was greater by almost a half and sugar content less by one sixth on vines treated with 2,3,4-T at 100 p.p.m. The treated berries were larger and their colouring less advanced. Among other related compounds tested 2,4,6-T and 2,3,6-T had significantly less effect than 2,3,4-T, and in another small trial 2,3,5-T was also less effective than 2,3,4-T when used at the same concentration. None of the compounds showed any formative effects on the vines.—C.S.I.R.O., Merbein, Vict.

1205. Weaver, R. J., Krimbas, B. D., and Davidis, U. X.
Response of Black Corinth and Thompson Seedless grapes to plant regulators under Greek conditions.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 169-77, bibl. 6.

Black Corinth grapes growing in the major currant-producing areas of Greece (Peloponnese) were sprayed with the diethanolamine salt of 4-chlorophenoxyacetic acid at concentrations ranging from 5 to 30 p.p.m. The compound at 10, 20 or 30 p.p.m. usually produced larger berries than did girdling alone. The largest berries usually resulted from girdling in addition to spraying. Little or no damage to foliage was produced by any of the sprays. Hard seedcoats developed in about 44% of the total number of berries in Black Corinth grapes when the vines were sprayed at full bloom with 4-chlorophenoxyacetic acid, but when the treatment was delayed for 3 days very few were produced. Applications of benzothiazol-2-oxyacetic acid to Black Corinth resulted in smaller berries than did 4-chlorophenoxyacetic acid. Thompson Seedless grapes in Corinthia and Crete were sprayed with 4-chlorophenoxyacetic acid at from 5 to 15 p.p.m. Berry size was greatly increased by the compound at 10 or 15 p.p.m., and the largest berries were produced by girdling in addition to applying the regulator. [Authors' summary.]—Univ. Calif., Davis, and Sup. Coll. Agric., Athens.

1206. Eggenberger, W.
Die Anwendung von Polyäthylenfolien im Weinbau. **(The use of polythene sheeting in viticulture.)**
Schweiz. Z. Obst- u. Weinb., 1957, **66**: 369-74, 391-6, bibl. 10, illus.

Fruit ripening was not improved when wire-trained vines were enveloped in polythene during the autumn. Polythene coverings over the fruit-bearing portion of staked vines has given protection against damage to berries by birds and hail, and to leaves against frost. Ripening has been improved by polythene coverings as shown by a rise in Öchsle value of 1 or 2°, and a decrease in total acids. No advantage is reported from the use of coloured polythene.—Wädenswil.

1207. Rao, U. N., and Muthuswamy, S.
Time of picking in relation to maturity of fruits in Anab-E-Shahi grape.
South Indian Hort., 1957, **5**: 106-10, bibl. 9.

Attempts at Coimbatore to correlate such physical characteristics as colour with maturity in the table grape Anab-E-Shahi were unsuccessful. Bunches similar in appearance varied considerably in total solids and sugar contents and in acidity. There was some indication that the age of the bunch from flowering might be used as a guide to maturity.

1208. Uota, M.
Evaluation of polyethylene film liners for packaging Emperor grapes for storage.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 197-203, bibl. 6.

Polythene films of 1·0, 1·5 or 2·0 mil. thickness, used as sealed box liners, were very effective in reducing weight loss of Emperor grapes packed in them. Modification of the atmosphere within the sealed liners was related to the thickness of the film. Sodium bisulphite preparations were necessary, however, for control of decay during storage in sealed liners. The best fruit quality was obtained by enclosing 10 g. sodium bisulphite and silica gel mixture (1 : 1) in the liner, but decay control was not as good as in the check lots. Perforated liners also effectively reduced weight loss and permitted sulphur dioxide to diffuse into the package during room fumigation.—U.S. Dep. Agric., Fresno, Calif.

1209. Ferenczy, L.
Examination of ether-extractable growth substances in grape and water-melon with paper chromatography. [Spanish summary 11 lines.]
Phyton, 1957, **9**: 47-52, bibl. 16.

Juice extracts from ripe grapes and water-melons both contained IAA and two growth inhibitors, tentatively called β and Ω, β being much more potent than Ω.

Nuts.

(*See also* 1065, 1088-1090, 1216o, u, 2032.)

1210. (Urquijo Landaluce, P.)
Obtención de castaños resistentes a la enfermedad de la tinta. **(Breeding chestnuts resistant to ink disease.)**
Rep. Inst. nac. Invest. agron. Madrid 1955–1956, 1957, pp. 161-4.

Chestnut hybrids between *Castanea sativa* and other species (including *C. crenata*, *C. mollissima* and *C. koreiensis*) have been selected for vigour, rooting capacity, resistance to ink disease and compatibility with scions of Spanish varieties. In general, French clones resistant to ink disease and American canker (*Endothia parasitica*) were less vigorous and less compatible with Spanish varieties than the new hybrids. The most successful method of vegetative propagation was stooling, treating the new basal shoots with growth substances and earthing up. Those which rooted during the summer were separated from the stump the following winter. Hybrids varied widely in rooting, the average being 22%, whereas native trees often gave 100%. Of the lanolin pastes used, the most effective were those containing either 0·5% NAA, 0·5% IBA and 0·1% 2,4-D sodium salt, or 0·8% IBA and 0·8% 2,4-D sodium salt. [See also *H.A.*, 28: 220b.]

1211. Harris, O. W., and Smith, C. L.
Chemical thinning of pecan nut crops.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 204-8, bibl. 3.

The data indicate that the nut crops of the Moore pecan may be thinned effectively by spraying with

MH, 2,4,5-T, or CIPC. The first two sprays were effective also on other varieties tested except the Stuart. However, application of these chemicals at concentrations effective in thinning the nut crops resulted in injury to the young leaves and in some cases to the shoots. Further work is needed to determine the proper concentrations and timing of sprays for practical and safe usage as well as their residual effects on the next crop. Also, considerable varietal differences in susceptibility to some of the thinning chemicals, as well as a selectivity in thinning related to tree vigor and other factors, were indicated. [Authors' conclusions.]—U.S. Dep. Agric., Shreveport, La.

1212. Tao, E.
Walnuts. [Chinese.]
Žen'min'žibao, August 26, 1955, No. 2970, from *Ref. Ž.* (*Biol.*), No. 13, Abstr. 55,792.

In China walnuts are grown mainly in the Shansi, Hopei and some neighbouring provinces. In the Shantung province early bearing varieties grafted on 3-year-old *Pterocarya stenoptera* began to produce 4 years later. One of the best early bearing varieties in the Shensi province is called "Ge njan' he tao", the kernel of which contains 60–70% oil.

1213. Maurer, K. J.
Die Problematik der Walnussveredlung in den Zonen des gemässigten Klimas. **(Problems of walnut propagation in temperate climates.)** [English, French and Spanish summaries 7 lines each.]
Mitt. Klosterneuburg, *Ser. B*, 1957, 7: 326-31, bibl. 6, illus.

A method of patch-budding for walnuts in the open, which has been developed at Geisenheim, is described; the best results were obtained when the temperature during and for 2 weeks after the operation was 35° C. or above. Two methods of propagation by budding under glass are described, in which 1-year-old stocks are used.

1214. Porpáczy, A.
Beiträge zu einigen Fragen der Fruchtbarkeit der Walnussbäume. **(Contributions to some problems of productivity in the walnut.** [English and Russian summaries ½ p. each.]
Acta agron. hung., 1957, 7: 1-23, bibl. 20, illus.

In Hungary *Juglans regia* and *J. nigra* are equally good as rootstocks for walnuts, though *J. nigra*, owing to its greater uniformity, high productivity and frost resistant stem, is of special interest as a stem-forming stock. *J. cinerea* is considered worthy of further tests, but *J. mandshurica* and *J. californica* were found unsuitable. It was shown that the quality of the nuts was affected by the prevailing weather conditions. The yield was essentially determined by the extent of bud differentiation, which occurs during the preceding late spring and is increased by high rainfall and temperature. In commercial nut growing supplementary irrigation may be necessary during this period. The bunches of *J. regia* vars. *fragilis* and *racemosa* developed fully only under the most favourable climatic conditions at the time of bud differentiation.

1215. Mihaleva, E. N., and Konovalov, I. N.
Adaptive changes in the gaseous exchange of walnut plants during acclimatisation. [Russian.]
Tr. Botanič. In-ta AN SSSR, 1956, **4**(11): 47-61, bibl. 38, from *Ref. Ž.* (*Biol.*), 1957, No. 14, Abstr. 60,183.

The daily rate of photosynthesis was studied in 2 to 30-year-old walnut trees grown in Leningrad from seed of different origin. It was found, among other things, that low soil moisture content during the second half of the summer, treatment with indolylacetic acid and short (9 hrs) day conditions increased photosynthetic activity at the beginning of the following summer and reduced it towards autumn. When the plants were entering into dormancy photosynthesis declined rapidly. This decline occurred earlier in plants better adapted to the Leningrad conditions, an effect explained by the earlier cessation of growth. The rate of respiration was higher at the beginning and the end of the season than in the middle of the summer. Treatment with indolylacetic acid increased the rate of respiration at the beginning of summer.

Noted.

1216.

a Alleweldt, G.
Der Einfluss von Photoperiode und Temperatur auf Wachstum und Entwicklung von Holzpflanzen unter besonderer Berücksichtigung der Gattung *Vitis*. **(The effect of photoperiod and temperature on growth and development of woody plants, with particular reference to the genus *Vitis*.)**
Vitis, 1957, **1**: 159-80, bibl. 89, illus.
A review.

b Blaha, J.
Uvologická charakteristika Chrupky bílé a červené. **(Ampelographic characteristics of the vine varieties White and Red Chrupka.)** [English, Russian and German summaries 8 lines each.]
Sborn. čsl. Akad. zěmed. Věd, Rostl. Výroba, 1957, **30**: 687-96, bibl 5.
Detailed descriptions of 2 dessert grapes.

c Breider, H.
Über die Bedeutung biometrischer Sortenvergleiche nach genetisch-züchterischen Gesichtspunkten. **(On the importance of biometrical methods in the comparison of [vine] varieties on genetical principles.)** [English, French and Spanish summaries about 6 lines each.]
Mitt. Klosterneuburg, *Ser. A*, 1958, **8**: 10-18, bibl. 4, illus.
On the determination of the parents of a vine variety by the biometrical study of its leaf characters.

d Breviglieri, N.
Situazione attuale e orientamenti nella produzione delle uve da tavola in Italia. **(Present status and trends in production of table grapes in Italy.)**
Atti Accad. ital. Vite 1956, 1957, **8**: 428-81, illus.
Including descriptions of many varieties.

e CAPRIOGLIO, A.
Il metodo fillometrico di A. Rodrigues applicato allo studio dei vitigni Barbera e Freisa. (**The phyllometric method of A. Rodrigues applied to the study of the vine varieties Barbera and Freisa.**)
Atti Accad. ital. Vite 1956, 1957, **8**: 514-58, bibl. 19, illus.
See *H.A.*, 23: 2385 for the method.

f CHANDLER, B. V., AND HARPER, K. A.
Anthocyanins in black currant fruits.
Nature, 1958, **181**: 131-2, bibl. 5.
Seven pigments separable by cellulose column chromatography.

g CHERUBINI, C., AND GONZÁLEZ, F. F.
Obtención de nuevas variedades de vid sin semilla. (**Obtaining new varieties of seedless grapes.**)
Rev. Fac. Cien. agrar. Mendoza, 1955, **5**(2): 19-49, bibl. 8.
New seedless hybrids, mainly Argentinian × French, are described.

h COSMO, I., COMUZZI, A., AND SAVIAN, A.
Indagini sulla ricostituzione viticola in provincia di Venezia. Secondo contributo —Zona del Piave. Terzo contributo— Zona del Brenta-Dese. (**Studies on reconstitution of vineyards in the province of Venice. Part 2. Piave area. Part 3. Brenta-Dese area.**) [English summaries 6+8 lines.]
Ann. Sper. agrar., 1957, **11**: 1419-58, 1459-74, bibl. 3.
Recommendations based on variety and rootstock trials. [For Part 1 see *H.A.*, 27: 3240c.]

i COSMO, I., AND POLSINELLI, M.
Verdiso. (**The vine variety Verdiso.**) [English summary 7 lines.]
Ann. Sper. agrar., 1957, **11**(5), Suppl. pp. LXXXVII–XCVI, bibl. 6, illus.
A white wine variety.

j DALMASSO, G.
La produzione dell' uva da tavola nel mondo. (**World production of dessert grapes.**)
Atti Accad. ital. Vite 1956, 1957, **8**: 409-27.

k GARGIULO, A.
Mutación espontánea tetraploide en Barbera d'Asti. (**A spontaneous tetraploid mutation of Barbera d'Asti.**)
Vitis, 1957, **1**: 156-8, bibl. 3, illus.
A vine with fertile inflorescences and berries twice the size of the diploid.

l HARITONOV, A. F. (EDITOR), AND OTHERS.
[Viticulture and wine-making in the U.S.S.R.]
Vinodelie i Vinogradarstvo, 1957, No. 8, pp. 8-42, illus.
Further information [see also *H.A.*, 28: 219q] on growing and processing the crop and achievements of research institutes.

m HUGHES, H. M., AND POTTER, J. M. S.
Strawberry variety trials at Efford Experimental Horticulture Station.
Exp. Hort., 1957, No. 1, pp. 34-9.
Of 9 virus-free varieties tested in the open in 1954 and 1955 Premier and Rearguard merit further trial.

n ISTITUTO NAZIONALE PER IL COMMERCIO ESTERO.
L'esportazione italiana delle uve da tavola. (**Table grape exports from Italy.**)
Atti Accad. ital. Vite 1956, 1957, **8**: 482-91.
European trade.

o KOLESNIKOV, V. A.
Expand the planting of nut crops. [Russian.]
Izd. Minist. seljsk. Hoz. S.S.S.R., Moscow, 1955, pp. 6, illus.
Nuts in general and hazel in particular are discussed.

p KRONENBERG, H. G.
Erdbeerselektion in den Niederlanden. (**Strawberry selection in the Netherlands.**
Reprinted from *Dtsch. GartenbWirtsch.*, 1958, Vol. **6**, Heft 1, pp. 4, illus.

q LEYVRAZ, H.
La production des raisins de table en Suisse romande. (**Table grape production in French-speaking Switzerland.**) [German, English and Italian summaries 10–16 lines each.]
Landw. Jb. Schweiz, 1957, **6**: 785-800, illus.

r ŁUCKA, M.
Porównanie plenności odmian truskawek. (**Cropping of strawberry varieties in Poland.**) [English and Russian summaries ½ p. each.]
Reprinted from *Zesz. nauk wyższ. Szkoły roln. w Krakowie*, 1957, No. 2, pp. 159-84, bibl. 21, illus.
Of 10 varieties tested the highest yields were obtained from Afrique, Oberschlesien, Climax and Georg Soltwedel.

s DE MOS, D.
Rode bes onder glas. (**Growing redcurrants under glass.**)
Fruitteelt, 1957, **47**: 1214-15, illus.

t SCOTT, D. H., AND DARROW, G. M.
Three new varieties of strawberries.
Fruit Var. hort. Dig., 1957, **12**: 21-2.
Earlidawn, Redglow and Surecrop.

u SPINA, P.
Studio sulle principali cultivar di mandorlo in provincia di Catania. (**Study of the main varieties of almond in the province of Catania.**)
Reprinted from *Tec. agric.*, 1957, Vol. **9**, pp. 52, bibl. 17, illus.

v STEPANOV, P. A.
A thornless gooseberry. [Russian.]
Agrobiologija, 1957, No. 4, p. 156, illus.
Variety Očer.

w WEURMAN, C., AND DE ROOIJ, C.
Chlorogenic acid isomers in "Black Alicante" grapes.
Chem. Ind. Lond., 1958, No. 3, p. 72, bibl. 9.
A compound, probably *neo*-chlorogenic acid, in fruit minus stalks.

PLANT PROTECTION OF DECIDUOUS FRUITS.

General.

(*See also* 1084, 1182, 1316c, j, m, 1317c, 1335-1340, 2009, 2024, 2058f.)

1217. GARMAN, P., AND OTHERS.
Plant pest handbook. A compendium based on findings of research in plant sciences for three-quarters of a century.
Bull. Conn. agric. Exp. Stat. **600**, 1956, pp. 194, illus.

Two brief introductory sections on plant diseases and pests and the damage they cause are followed by the main section, in which specific injuries are described under the most common or important host plants arranged alphabetically. Cross references to other possible hosts are given.

1218. GODBOUT, F., AND OTHERS.
Manuel de pulvérisation du verger. (**Manual of orchard spraying.**)
[*Publ.*] *Serv. Inf. Rech., Minist. Agric., Québec*, 2nd edition revised, 1957(?), pp. 72, illus.

This symposium, dealing with many aspects of spraying in apple orchards, includes: equipment and technique; control of scab, bacterial blight, mites and numerous insects; fungicides and insecticides and their compatibility; advisory and warning services; sprays for nutrition (urea, B and Mg), flower and fruit thinning, fruit drop prevention and advancement of ripening; control of field mice.

Disturbances of nutrition or of unknown origin.

(*See also* 1160-1162, 1316s.)

1219. WALKER, D. R., AND FISHER, E. G.
The use of chelated magnesium and magnesium sulfate in correcting magnesium deficiency in apple orchards.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 15-20, bibl. 13.

In this study chelated Mg, applied as foliar sprays or as soil applications, was not as effective in increasing leaf Mg in apple trees as foliar sprays of magnesium sulfate. Trees sprayed with magnesium sulfate in early to mid-July contained significantly (·01 level) more Mg in their leaves in September than did trees similarly treated in June shortly after bloom. [Authors' summary.]—Cornell Univ., Ithaca, N.Y.

1220. HAGLER, T. B.
Effect of magnesium sprays on Muscadine grapes.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 178-82, bibl. 6, illus.

In an attempt to find a satisfactory foliar spray for correction of the Mg deficiency of Muscadine vines, which occurs widely in Alabama, vines were grown in sand culture with complete nutrient or minus-Mg solutions. The minus-Mg plants were sprayed with Mg in the form of nitrate, chloride, phosphate, sulphate, carbonate, oxide, acetate or chelates. Total dry weight of plants given foliar sprays was significantly less than that of full nutrient plants, except in the case of plants sprayed with magnesium chloride at the rate of 91·4 g. per gal. The Mg content of leaves sprayed with this rate of magnesium chloride was 0·30%, compared with 0·37% on a dry weight basis for leaves receiving the full nutrient solution.—Ala Polytech. Inst., Auburn.

1221. TOORENAAR, G.
Vroegtijdige bladval bij Golden Delicious. (**Premature leaf-fall of Golden Delicious.**)
Fruitteelt, 1958, **48**: 136-7, illus.

Premature leaf-fall of Golden Delicious, which occurs in the southwestern islands of Holland, is attributed to a disturbance in growth. Leaf-fall was largely prevented by sprays of Tuzet (ziram, TMTD and an arsenical dithiocarbamate) applied for scab control.

Climatic factors.

(*See also* 1030, 1111, 1127, 1133, 1192, 1206, 1316k, p, w, 1317i.)

1222. JENNY, J.
La protection des végétaux contre le gel printanier. Chauffage et arrosage. (**Plant protection from spring frost. Heating and sprinkling.**)
Tracteur Mach. agric., 1956, **18**(3): 7-16, bibl. 4, illus., reprinted as *Publ. Stat. féd. Ess. agric. Lausanne* **498**.

Standardization of temperature recording for the air and for fruit tree buds is discussed with examples from apple and pear buds in mid winter, and from pear trees protected by frozen spray. Variations in winter temperature at different heights above the soil with reference to sunrise and sunset and the effects of presence and absence of sward are discussed. Different types of orchard heater are briefly compared, and the possible use of fungicide spray apparatus for sprinkler frost protection is examined.

1223. LIWERANT, J., AND MARTY, J. R.
Sur quelques facteurs ayant influencé la résistance de la vigne au froid de février 1956. (**Some factors which affected resistance of vines to the frost of February 1956.**)
C.R. Acad. Agric. Fr., 1957, **43**: 814-21, bibl. 3.

On the whole, frost resistance was higher in hybrid vines than in *V. vinifera* and higher in early than in late-ripening varieties. It was markedly reduced by pruning before the frost. Deep placement of P and K for vines adequately supplied with N increased frost resistance.

1224. OLLRAM, F.
Über die Holzreife und Frosthärte von Schnittreben. (**On wood maturity and frost resistance in vine rootstocks.**) [English, French and Spanish summaries 5–6 lines each.]
Mitt. Klosterneuburg, Ser. A, 1958, **8**: 30-4, bibl. 7.

Hardiness in vines, as the author's observations show, is not related to wood maturity. Plants with mature wood suffered injury and non-lignified shoots of other vines remained resistant under similar conditions. A correlation was, however, found to exist between hardiness and the amount of starch grains stored in the medullary rays. Further studies suggest that stored starch grains may differ slightly in composition in different varieties: one kind breaks down under the influence of frost, whereas the other remains stable through the winter months. Only the latter kind has a protective action.

1225. Karnatz, H.
Das Kalken der Stämme—eine wichtige Schutzmassnahme im Obstbau. **(White-washing fruit tree trunks for frost protection.)**
Mitt. ObstbVersuchsringes Jork, 1957, **12**: 195-9, bibl. 1, illus.

Records taken in March 1957 show the differences in the temperature of fruit tree stems on their north and south sides, the drop in temperature on the south side due to white-washing and the rise in temperature due to the application of a dark hare repellent. The addition of 2·4% casein to the white-wash (hydrate of lime) greatly improved the resistance and whiteness of the cover. The cost of the operation was 2–6Pf. per stem according to the age of the tree.—Obstb-Versuchsanst. Jork.

1226. Krapf, B.
Grünflecken, "Green Blotch", auf Äpfeln. **(Green blotch of apples.)**
Schweiz. Z. Obst- u. Weinb., 1957, **66**: 594-600, bibl. 12, illus.

In Swiss orchards fruits of many apple varieties, especially Glockenapfel, partially failed to colour in the late summer of 1957, thus retaining green spots up to harvest time. Photographs show external symptoms and sections of tissue below the spots appearing on the skin. The very irregular structure of affected tissues is attributed to the formation of ice crystals in the fruit in spring.—Wädenswil.

1227. Burmistrov, A. D.
The effect of shelter belts on the distribution of snow in the orchard. [Russian.]
Sad i Ogorod, 1957, No. 11, pp. 31-3.

Two graphs are given showing the effect of northern and western shelter belts on the depth of snow in some orchards in Latvia in 1956. In the proximity of the belts snow drifts of various depths, depending on the construction of the belts, were found, but 30–50 m. distant from them the snow cover was more or less even. It is recommended that shelter belts round orchards should be planted 4–5 rows deep, with trees 1·2 m. and shrubs 0·6 m. apart in rows 1·5 m. apart. Suitable species are listed.

1228. Berežnoj, P. S.
The effect of screens on the growth and yield of strawberries in the Donbas. [Ukrainian.]
Bjul. naukovo-tehn. Inform. po Sadivn., 1956, No. 1, pp. 12-14, from *Ref. Ž.* (*Biol.*), 1957, No. 14, Abstr. 60,815.

To give protection from wind and thereby increase the yield of strawberries in the Ukraine to 50–60 centners per ha., a row of sorghum or maize should be sown between every 5–6 rows of strawberries.

1229. Rui, D.
I vari aspetti della difesa della viticoltura dal flagello della grandine. **(Various aspects of protection of vines from hail.)**
Friedmann, G.
Assicurazione dei viticoltori contro i danni della grandine. **(Insurance for vine growers against hail damage.)**
Galeone, G.
Assicurazione contro la grandine. **(Insurance against hail.)**
Riccardi Candiani, G.
Qualche considerazione sul problema della grandine in Piemonte. **(Some observations on the hail problem in Piedmont.)**
Atti Accad. ital. Vite 1956, 1957, **8**: 280-8, bibl. 1; 289-92; 293-8; 299-307.

The use of rockets to prevent hail storms gave good protection of vineyards in various districts of Italy in 1955. The economic aspect is discussed. The part played by weather forecasting (including the use of radar) is discussed. Suggestions for improving insurance possibilities are outlined.

Air pollution.

(*See also* 1081b.)

1230. Brewer, R. F., McColloch, R. C., and Sutherland, F. H.
Fluoride accumulation in foliage and fruit of wine grapes growing in the vicinity of heavy industry.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 183-8, bibl. 5, illus.

A survey was made of the fluoride content of foliage and fruit of the Zinfandel and Palomino wine grape varieties grown in western Riverside and San Bernardino counties, California. Abnormally high fluoride concentrations were found in mature grape leaves collected as far as 9 miles downwind from a steel mill, the major source of this element in the local atmosphere. Periodic samplings of leaves indicated a gradual accumulation of fluoride by both varieties during the growing season. Where comparison was possible, Zinfandel accumulated slightly more fluoride but exhibited somewhat fewer symptoms of injury than did Palomino. In general incidence of leaf injury, a characteristic marginal necrosis, correlated well with fluoride content, but indications are that other factors, such as temperature, humidity, and available soil moisture, also influence the extent of injury. Although the leaves contained over 100 p.p.m. F on a fresh-weight basis, fruit harvested within 2 miles of a large steel mill contained only about 1·3 p.p.m. fluoride. The effects, if any, of elevated fluoride concentrations and subsequent marginal necrosis on grape production cannot be determined from the information now available. [From authors' summary.]—Univ. Calif. Citrus Exp. Stat. Riverside.

1231. Reckendorfer, P.
Über das Fluor-Eisen-Gleichgewicht in der pflanzlichen Zelle. Ein Beitrag zur Mikrochemie der Chlorose. **(The fluorine-iron equilibrium in the plant cell. A report on the microchemistry of chlorosis.)** [English summary ½ p.]
PflSch. Ber. Wien, 1957, **19**: 135-44, bibl. 8.

Yellowing in fluorine-damaged cherry leaves is shown to originate from a disturbance in equilibrium during the process of chlorophyll synthesis. A method of micro-iron determination is described.—Lab. Bundesanst. PflSch. Wien.

Bacteria.

(*See* 1169 l.)

Viruses.

(*See also* 1316 l, m, t, x, 1317.)

1232. Mezzetti, A.
Una nuova malattia delle mele: la rugginosità ulcerosa. **(A new disease of apples: ulcerated russeting.)**
Inf. fitopat., 1957, **7**: 320-1, illus.

Symptoms of this virus disease appear only on the fruit skin and are sometimes confused with either scab, spray burns or B deficiency. The disease spreads slowly and is transmitted by grafting, but not apparently by affected fruit. The only method of control appears to be removal and replacement of diseased trees.

1233. Bhargava, K. S., and Bist, N. S.
Three virus diseases of hill fruits in Kumaon.
Curr. Sci., 1957, **26**: 324-5, bibl. 1, illus.

Line pattern disease in plums, apple mosaic in apples and necrotic leaf-spot in peach were recorded for the first time in India. Short descriptions of the symptoms and the varieties affected are given.

1234. Morvan, G.
Transmission par greffage des symptomes de dépérissement de l'abricotier. **(Transmission by grafting of the symptoms of die-back in apricot trees.)**
Fruits d'Outre Mer., 1957, **12**: 335-9, bibl. 3, illus.

The symptoms of this virus disease, transmitted by grafting onto plum or peach stocks, appear to vary with the source of the diseased budwood. Scions should be taken from trees free from symptoms and the taking of suckers from plum trees growing in orchards for use as rootstocks should be condemned. This practice, so common in the Rousillon area, probably explains why the disease is so prevalent there. The systematic cutting out of diseased trees is also recommended.

1235. Ehlers, C. G.
Separation and identification of viruses that incite diseases of stone fruits.
Diss. Abstr., 1957, **17**: 1879-80, being *Publ.* 22,337 of 66 pp.

Dormant bud sticks of sour cherry were heat treated in a water bath at 50° C. and 35° C. Inoculations made to sour cherry and Italian prune showed that the sour cherry yellows virus and the necrotic ring spot virus were not inactivated by 35 min. treatment at 50° C., but were inactivated by approximately 36 hours' treatment at 35° C. The prune dwarf virus was inactivated after 22 min. at 50° C. and after 30 hours at 35° C. Symptoms of necrotic ring spot, yellows and prune dwarf failed to develop on Montmorency cherry and Italian prune trees inoculated with buds from dormant bud sticks, which had been soaked for 1 hour in certain chemical solutions, including the substitute purine and pyrimidine compounds. Ring spot virus, however, was recovered later from the sour cherry trees which did not show symptoms after inoculation. Further inoculation studies are reported. —Univ. Wisconsin.

1236. Ciferri, R., and others.
Virus dieback of sweet cherry at Verona, Italy.
FAO Plant Prot. Bull., 1957, **6**: 37-8, illus.

The first symptoms of virus dieback of sweet cherry appear on a few leaves, then all the foliage is affected and in 3–6 years the tree dies. On the variety Mora di Cazzano oily spots appear on the leaves and phloem necrosis occurs; these symptoms are followed by the leaves curling and yellowing with the margins turning red. Diseased trees flower profusely but yield poorly. Some leaf symptoms have been seen on seedlings of *Prunus avium*, but none on young trees of the rootstock *P. mahaleb*.—Lab. crittog. ital., Pavia, and Osserv. fitopat., Verona. J.R.L.

1237. Milbrath, J. A.
Effect of some sour cherry viruses on growth of young orchard trees.
Phytopathology, 1957, **47**: 655-7, bibl. 10, illus.

Montmorency sour cherry trees were inoculated before planting out with various combinations of mild and severe strains of ring spot, sour cherry yellows, peach stunt, prune dwarf, a sour cherry bark-splitter and sour cherry midleaf necrosis viruses. The presence of any of these viruses caused a substantial reduction in tree growth after 4 years. This growth reduction increased with strain severity and with the number of viruses present.—Ore. St. Coll., Corvallis.

1238. Schuch, K.
Reaktionsbilder bei der F 12/1 Unterlage nach künstlicher Virusinfektion. **(The response of the F 12/1 rootstock to artificial virus infection.)**
Dtsch. Baumsch., 1958, **10**: 36-8, bibl. 3, illus.

Illustrated descriptions are given of the leaf symptoms appearing in the cherry rootstock F 12/1 after transmission of the enation, tatter leaf and necrotic ringspot viruses.—Inst. f. Obstbau, Heidelberg.

1239. Průša, V., and Jermoljev, E.
Pásková chlorosa švestek. **(Banded chlorosis in damson.)** [Russian summary ½ p.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1957, **30**: 709-26, bibl. 12.

The economic importance of this virus disease in Czechoslovakia has not been established yet; the symptoms appear only on the leaves. During studies on damson leaves no characteristic changes in peroxidase activity were noted, but catalase activity in the leaves of diseased plants (with acute and latent infections) was lower than in those of healthy plants. The activity of 2 hydrolytic enzymes (invertase and diastase) was also lower in the diseased plants. For diagnosing the disease determinations of catalase activity were found reliable. The leaves of diseased plants were also found to have a higher dry matter content than those of healthy ones, but differences in other components were not apparent.

1240. Posnette, A. F., and Ellenberger, C. E.
Bark-split—a virus disease of plums.
Ann. appl. Biol., 1957, **45**: 573-9, bibl. 6, illus.

The bark-split disease of plums commences with necrotic lesions in the outer bark, causing depressions on the surface; these lesions extend in area and depth, resulting in split and roughened bark, and crippling or killing trees of sensitive varieties like Cambridge Gage. The causal virus was transmitted by grafting in the dormant season, but, probably because it is localized in older tissues, it was rarely transmitted or scion-perpetuated by summer budding. About 90% of Common Plum clonal rootstocks from East Malling Research Station's layer-beds were found to be infected. Apparently virus-free Common Plum was propagated by cuttings from the roots of Common Plum under normal Cambridge Gage trees. A different type of bark-split disease developed on Shiro Plum inoculated with virus from a tree of Quetsche Précoce de Zimmer. Leaf symptoms accompanying infection with this and with the virus from Common Plum were similar. Bark-split disease is compared and contrasted with diamond canker of French Prune in California, and features that distinguish bark-split from bacterial canker are described. [Authors' summary.]—E. Malling Res. Stat., Kent.

1241. Cadman, C. H., and Fisken, A. G.
Susceptibility of raspberry varieties to infection by aphid-borne viruses.
J. hort. Sci., 1958, **33**: 13-20, bibl. 5.

Of the varieties tested Norfolk Giant was the most resistant and Lloyd George the most susceptible to leaf spot virus; Malling Promise was most resistant to veinbanding virus and Lloyd George and Malling Jewel the most susceptible. Both viruses spread slowly. Systox, 0·1% at 250–300 gal./acre, was more effective than DDT or parathion in decreasing the aphid population on Lloyd George, and it also appeared to decrease the spread of veinbanding virus.

1242. Frazier, N. W., and Posnette, A. F.
Transmission and host-range studies of strawberry green-petal virus.
Ann. appl. Biol., 1957, **45**: 580-8, bibl. 9, illus.

The virus causing phyllody (virescence) in clover flowers was transferred by *Cuscuta subinclusa* to *Fragaria vesca* and *Duchesnia indica* plants which then produced symptoms of strawberry green-petal disease. Variation in symptoms on strawberry plants infected naturally, and experimentally through dodder, suggested that two diseases have previously been grouped under the name "green petal". It is proposed to distinguish these as (a) green petal caused by the viru inducing phyllody in clover, and (b) bronze leaf wil caused by the clover witches' broom virus. [From authors' summary.]—Univ. Calif., Berkeley, and E. Malling Res. Stat., Kent.

1243. Brückbauer, H., and Pioth, L. C.
Physiologisch-chemische Untersuchungen an gesunden und reisigkranken Reben. **(Physiological and chemical studies of healthy vines and those affected by infectious degeneration.)**
Angew. Bot., 1957, **31**: 174-90, bibl. 27, illus.

The presence of callus in the phloem and the results of various chemical tests on the sap distinguished vines suffering from active or latent infectious degeneration from healthy vines.

1244. Ochs, G.
Rebenvirus auf Gründüngungspflanzen. **(Vine virus on green manure plants.)** [English, French and Spanish summaries about 4 lines each.]
Mitt. Klosterneuburg, *Ser. A*, 1958, **8**: 19-21, bibl. 5, illus.

In the Ahr and Moselle valleys of Germany it is customary to establish leguminous green manure crops on fallow vine soils after the grubbing of a vineyard infected with court-noué. The author found that *Medicago sativa*, *Lathyrus tingitanus*, *Vicia faba minor*, *V. faba major* and *V. sativa* are susceptible to panachure virus, a constituent of court-noué, while *Melilotus albus*, *Brassica napus* and *Sinapis alba* are resistant.

Fungi.

(*See also* 1210, 1316q, 1317f, l.)

1245. Fernand, —.
Contrôle physiologique de la tavelure du pommier. **(Physiological control of apple scab.)**
Rev. d'Oku, 1957, **31**: 130-7.

A large number of mineral substances were tested during 1953–1956 inclusive in an attempt to find whether any substance, when absorbed by an apple tree, would provide immunity of the leaves and fruit to *Venturia inaequalis* attack. McIntosh trees of 2–4 years old were used. The results are tabulated in detail. Many of the treatments resulted in absence of scab infection, but as 2 of the seasons were very unfavourable to scab development further tests are required. In the most favourable test year the only treatment which completely prevented the development of scab was a mixture of 0·05% uranium acetate and 0·05% gramicidine. The work is to be continued under controlled greenhouse conditions.

1246. Oort, A. J. P.
Gloeosporium-vruchtrot bij appels. **(Gloeosporium rot of apples.)** [English summary 1 p.]
Reprinted from *Meded. LandbHogesch. Gent*, 1956, **21**: 507-18, bibl. 3, illus.

Inoculations of 1- to 3-year-old branches with *Gloeosporium perennans* and to a lesser extent with *G. album* have resulted in the development of branch cankers.

Data collected at the Instituut voor Bewaring en Verwerking van Tuinbouwproducten at Wageningen show that apples from the top of the trees were less heavily attacked by *Gloeosporium* than those from the lower part. More rot occurred at the second picking than at the first or than with continual picking. Bagging of the fruits on the tree greatly increased fruit susceptibility to *Gloeosporium* infection.—Lab. Phytopath., Wageningen.

1247. Rojecka, N.
Ze studiów nad *Entomosporium maculatum* Lév.—brunatna plamistość—wraz ze sposobami jej zwalczania. **(*Entomosporium maculatum* and its chemical control.)** [English and Russian summaries ½ p. each.]
Roczn. Nauk rol., Ser. A, 1957, **75**: 255-65, bibl. 14, illus.

E. maculatum infecting wild pear seedlings in the nursery was most effectively controlled with 1% bordeaux, which also stimulated plant development.

1248. Vörös, J.
A trichothecin antibiotikum alkalmazása meggymonilia ellen. **(Trichothecin as an antibiotic against blossom blight on sour cherries.)** [English and Russian summaries ¼ p. each.]
Növénytermelés, 1957, **6**: 67-70, bibl. 3.

A 2·25 unit/ml. concentration of trichothecin inhibited the growth of *Monilia laxa in vitro*. In greenhouse experiments concentrations of up to 100 unit/ml. caused no injury to cherry flowers. In 2 field trials in 1956 spraying into the flowers with 50 unit/ml. concentration reduced infection by from 70 to 95%. [See also *H.A.*, 26: 2659.]

1249. Cation, D.
Two years' results of testing Cyprex for control of cherry leaf spot in Michigan.
Plant Dis. Reptr, 1957, **41**: 1029-31.

Cyprex (duodecylguanadine acetate) at ½ lb. or more per 100 gal. showed exceptional promise for controlling spot (*Coccomyces hiemalis*) on sour cherries in 1956 and 1957. Only one of the other fungicides tested, a Glyodin-ferbam combination, equalled it in control and foliage retention in 1956, a year of average infection. Cyprex also prevented injury from lead arsenate, which was included as the standard insecticide.—Mich. St. Univ., East Lansing.

1250. Casarini, B.
Il corineo del ciliegio. **(Shot-hole disease of cherries.)**
Inf. fitopat., 1957, **7**: 326-31, illus.

The best time for treatment was at petal fall. Both buds and leaves were better protected by 0·25% TMTD than by captan or zineb at 0·3% or copper oxychloride at 0·35%.

1251. Jenkins, P. T.
Apricot diseases. Fruit spotting and shot-hole.
J. Agric. Vict., 1957, **55**: 807-9, illus.

Bordeaux mixture 15 : 15 : 100 at leaf fall and at the pink bud stage, and Thiram 0·12% plus ½% white oil at petal fall and shuck fall, control scab and shothole (*Clasterosporium carpophilum*). An additional spray of Thiram, as above, 6–8 weeks after shuck fall is necessary in southern Victoria to control freckle (*Fusicladium carpophilum*). Spotting caused by *Pseudomonas syringae* is partially controlled by the same spray programme.

1252. Casarini, B.
Trattamenti antibolla ed anticorineo sui peschi in vegetazione. **(Treatments for control of leaf curl and shot hole in peach trees during the growing season.)**
Inf. fitopat., 1957, **7**: 251-3, illus.

Leaf curl affected fruits as well as leaves. The best control was given by a TMTD product at 0·2%, applied at the beginning and end of April. Captan at the same rate and copper oxychloride (50% copper) at 0·3% were slightly less effective. Barium polysulphide at 1%, copperized sulphur at 1% and colloidal sulphur at 0·3% were ineffective and zineb at 0·2% gave only moderate control. Premature defoliation resulted only from copper oxychloride.

1253. Pirovano, A.
La deleteria azione delle rugiade sulle drupacee. **(Damage to stone-fruit trees by rust.)**
Riv. Ortoflorofruttic. ital., 1957, **41**: 571-4, bibl. 2. illus.

Gauze cages with wooden frameworks, intended to protect late-ripening peaches from Mediterranean fruit fly, incidentally kept the trees free from *Puccinia persicae* which severely damaged neighbouring trees with exposed foliage.

1254. Orchard, W. R., and van Adrichem, M. C. J.
Relative resistance of some strawberry species, varieties, and selections to powdery mildew at Saanichton, British Columbia.
Plant Dis. Reptr, 1957, **41**: 945-7, bibl. 4.

Powdery mildew (*Sphaerotheca macularis* (=*S. humuli*)) is a relatively serious disease of strawberries in British Columbia. In 1957 disease ratings were established for several *Fragaria* species and for 67 strawberry varieties and selections. Two species and one variety (Auchincruive No. 6) were free from infection, and 16 others showed only a trace of mildew. Of the species showing no mildew one, *F. glauca*, was represented by two selections from northern B.C. and from the Yukon; in contrast a third selection from Vancouver Island showed substantial infection. In comparing the ratings obtained at Saanichton with those reported from the U.S.A. there were differences in the behaviour of some of the varieties.—Sci. Serv., Canada Dep. Agric.

1255. (Urquijo Landaluce, P.)
Ensayos de tratamiento contra el mildio de la vid. **(Experiments for control of [downy] mildew of vines.)**
Rep. Inst. nac. Invest. agron. Madrid 1955–1956, 1957, p. 165.

A 60% attack of downy mildew was reduced to 15% by copper fungicides and to 20% by non-copper products, including captan and zineb.

1256. Emiliani, G.
Sperimentazione antiperonosporica con prodotti acuprici dell'anno 1956. **(Experiments on control of downy mildew on vines with non-copper fungicides during 1956.)** [English summary ⅓ p.]
Bol. Staz. Pat. veg. Roma, 1956, **14**: 189-211, bibl. 4.

The fungicides compared were bordeaux mixture, zineb (alone, with added sulphur and with added copper) and captan. The sulphurized product gave the best and the copperized the poorest control of downy mildew. Non-copper fungicides gave their best results early and copper products later in the season. Captan strongly stimulated growth of secondary shoots, but caused some deformity and blistering of leaves. Zineb-treated vines produced luxuriant, healthy leaves. The organic products were useless against powdery mildew. No definite conclusions could be drawn concerning premature leaf fall. Fruit yield per vine was highest with copperized zineb and lowest with captan. Sugar content was highest and ripening earliest with bordeaux mixture. [For previous year see *H.A.*, 27: 297.]

1257. Görög, L.
2,4-dinitro-rodánbenzol tartalmú paszta peronoszpóra elleni védőhatása az 1956-os nagyüzemi kisérletek alapján. **(Control of downy mildew on a field-scale in 1956 with a preparation containing 2,4-dinitrorodanbenzol.)** [Russian and English summaries ¼ p. each.]
Növénytermelés, 1957, **6**: 175-80, bibl. 9.

A preparation containing 37·5% 2,4-dinitrorodanbenzol, 11% copper oxychloride, a wetting agent and water has been used in field experiments for downy mildew control on vines. It was applied as a spray at a rate of 150 g. DNRB in 100 l. water, and in warm humid conditions was as effective as bordeaux for downy mildew control.—Res. Inst. Plant Prot., Budapest.

Nematodes.

(*See also* 1317e.)

1258. Mountain, W. B., and Boyce, H. R.
The peach replant problem in Ontario. V. The relation of parasitic nematodes to regional differences in severity of peach replant failure.
Canad. J. Bot., 1958, **36**: 125-34, bibl. 10.

A survey of mature peach orchards showed that *Pratylenchus penetrans* is considerably more prevalent in peach soils in Essex County than in the Niagara Peninsula. In both areas orchards that had a previous history of the replant problem had a 3 to 4 times greater soil population of *P. penetrans* than those with no such history. Soils of finer texture were shown to limit the populations of *P. penetrans*, and the relatively low numbers of this nematode in the Niagara Peninsula appear to result from the influence of the finer soils prevailing in that region. The effect of different soil-particle sizes on the build-up of *P. penetrans* may explain the distribution of the peach replant problem in Ontario. [From authors' abstract. For part IV see *H.A.*, 27: 1300.]—Sci. Serv., Canada Dep. Agric., Ottawa, Ont.

1259. Mountain, W. B., and Boyce, H. R.
The peach replant problem in Ontario. VI. The relation of *Pratylenchus penetrans* to the growth of young peach trees.
Canad. J. Bot., 1958, **36**: 135-51, bibl. 7.

Further evidence was accumulated indicating that the peach replant disease decreases in severity as the interval increases in time between removal of the old orchard and the planting of new trees. The ameliorating effect of the interval may be related to the decline of *Pratylenchus penetrans*. In experiments increased growth of peach was associated with the control of *P. penetrans* by nematocides, and *P. penetrans* was found to be the first nematode to attack newly developing peach roots. The populations of *P. penetrans* within such roots increased rapidly, then gradually declined. Generally, ectoparasites appeared later, increased relatively slowly, and occurred infrequently until late in the second growing season. The soils of all commercial peach nurseries in Ontario contain *P. penetrans* and the nematode may be transported in the roots of nursery stock. [From authors' abstract.]—Sci. Serv., Canada Dep. Agric., Ottawa, Ont.

Mites.

(*See also* 1302, 1303, 1316z, 1317b, 1450.)

1260. de Vrie, M.
Resistentie van het fruitspint tegen bestrijdingsmiddelen. **(Resistance of red spider mite to acaricides.)**
Fruitteelt, 1958, **48**: 150-1.

In laboratory tests, high mortality among mites from neglected orchards was obtained with organic P compounds, but mites from frequently-sprayed plots were much more resistant. Mites from both sources were susceptible to kelthane.

1261. Shea, W. D.
Efficiency of oils and other early season treatments for the control of the European red mite.
J. econ. Ent., 1957, **50**: 518, bibl. 2.

Results obtained with 4 oils tested against overwintering eggs of European red mite (*Metatetranychus ulmi*) on apple trees were similar. Control efficiency was increased by adding either parathion or malathion to the oil.—N.Y. St. agric. Exp. Stat., Geneva.

1262. Picco, D.
Attività di alcuni prodotti contro le uova ibernanti di *Paratetranychus pilosus* anche in rapporto al sistema di allevamento dei fruttiferi. **(Activity of various products against winter eggs of *Paratetranychus pilosus* and in relation to the system of training fruit trees.)** [English summary ¼ p.]
Not. Mal. Piante, 1957, No. 42, pp. 65-71.

For control of red spider mite in apple and pear orchards, oil preparations, particularly a DNOC-oil mixture, were very effective and calcium polysulphide was useless. DNBP gave good results on apple, but not on pear trees. Control was easier on goblet-trained trees than on vertical cordons.

1263. Lanchester, H. P.
An emergency summer treatment of pear leaf blister mite.
J. econ. Ent., 1957, **50**: 695-6, bibl. 2.

In Washington 21% demeton emulsifiable concentrate applied to pear trees, when it was too late for dormant sprays, gave very good control of pear leaf blister mite (*Eriophyes pyri*). The quantity of the material used varied with the degree of infestation and in no case caused damage to either leaves or fruit.

1264. Baumann, G.
Über eine durch ektoparasitische Gallmilben verursachte Gelbfleckigkeit (Sternfleckenkrankheit) bei Prunus-Arten. (**Yellow spot of *Prunus* species caused by ectoparasitic eriophyid mites.**) [English and Russian summaries 10 and 13 lines respectively.]
NachrBl. dtsch. PflSchDienst, Berlin, 1957, **11**: 246-50, bibl. 17, illus.

Yellow spot of some *Prunus* species was shown to be caused by *Vasates fockeui*, and not by a virus disease. Successful mite control was obtained by systemic insecticide applications.—Inst. Phytopath., Aschersleben.

1265. Anthon, E. W.
Control of the plum nursery mite on sweet cherries.
J. econ. Ent., 1957, **50**: 564-6, bibl. 2.

In extensive trials in north central Washington during 1954–1956 one of the best materials against plum nursery mite (*Vasates fockeui*) was wettable sulphur. Delayed dormant sprays of lime-sulphur were also effective but did not give season-long control. Many other acaricides have given good control for 1 month and Chlorobenzilate, Kelthane, Aramite and Sulphenone, if applied 5 weeks before harvest, showed little visible residue. Aerial dust applications of 4% Aramite plus 1% TEPP also gave good control.—Tree Fruit Exp. Stat., Wenatchee, Wash.

1266. Allen, W. W., Nakakihara, H., and Schaefers, G. A.
The effectiveness of various pesticides against the cyclamen mite on strawberries.
J. econ. Ent., 1957, **50**: 648-52, bibl. 27.

Spray applications of more than 50 pesticides were made to field grown strawberries to determine their effectiveness against the cyclamen mite, *Steneotarsonemus pallidus*. In these tests azobenzene, endrin and Thiodan proved to be the most effective materials. The commonly used acaricides and systemic pesticides were all ineffective. The phosphate pesticides varied greatly in their effectiveness, but even the best gave insufficient control to prevent rapid return of populations to their previous levels. [Authors' summary.]—Univ. Calif., Berkeley.

1267. van de Vrie, M., and Groenewold, H.
Biologie en bestrijding van de aardbeimijt in productievelden. (**Biology and control of strawberry mite in the field.**)
Fruitteelt, 1958, **48**: 141-3, illus.

Three substances are recommended for control, namely 0·2% endrin, 0·25% Kelthane or 0·3% Thiodan. Endrin and Thiodan should be applied after harvest but Kelthane may be applied up to 14 days before picking. [See also *H.A.*, 28: 302.]

1268. Reynolds, H. T., and Huffman, J. W.
Methyl bromide fumigation for control of cyclamen mite on strawberries.
J. econ. Ent., 1957, **50**: 525-6, bibl. 3.

In field experiments in California methyl bromide at 2 lb. per 1,000 sq. ft. applied for 2 hours at 65–85° F. during dormancy gave good control of cyclamen mite (*Steneotarsonemus pallidus*) on strawberries and stimulated subsequent growth. Improvements in fumigation technique are outlined.

1269. Mathys, G.
Étude des possibilités d'intervention contre *Phyllocoptes vitis* Nal., agent du court-noué parasitaire de la vigne. (**A study of the possibility of control of *Phyllocoptes vitis*, the cause of a court-noué in the vine.**)
Rev. romande Agric. Vitic., 1957, **13**: 95-7, bibl. 4, illus.

Simultaneous control of *Phyllocoptes vitis* and *Metatetranychus ulmi* on vines could not be obtained by a single acaricidal spray in the spring. Control of *Phyllocoptes* was best with a spray of Phenkaptone or a parathion or oleoparathion compound in early April (green tip), Phenkaptone being the least harmful to *Typhlodromus* predators. A second application when the young shoots are about 5 cm. long may be necessary for control of red spider. Lime sulphur sprays applied just before the green tip stage have reduced populations of *Phyllocoptes*, but are not sufficiently effective against heavy infestations.

Insect pests.

(*See also* 1197, 1304-1306, 1316b, n, u, v, 1317a, d, g, k, m, 1884.)

1270. Madsen, H. F., and Bailey, J. B.
Rosy apple aphid control tests.
Calif. Agric., 1958, **12**(1): 3, 15, illus.

Three combinations of oil plus phosphate used as delayed dormant sprays were tested as substitutes for spring foliage sprays against rosy apple aphids. Trithion plus oil, Phostex-oil miscible and Nialate-oil miscible were applied during late March. Counts in May/June showed that all materials gave effective control. Trithion plus oil and Nialate-oil miscible considerably reduced European red mite populations, but Phostex-oil miscible had no effect. Foliage sprays of Systox, Thimet and Diazinon applied in May for woolly aphid control gave good control of rosy apple aphid, but a winter treatment is still preferable.—Univ. Calif., Berkeley.

1271. Moreton, B. D., and Bryden, J. W.
Control of apple aphids and caterpillars by spring washes.
Exp. Hort., 1957, No. 1, pp. 43-50, bibl. 2.

A good control of oat-apple and green apple aphids on apple has been obtained with 0·1% BHC w.p. suspension, and 0·1% DDT emulsion with and without spreader, applied at bud burst; the degree of control varying from about 97 to nearly 100% reduction of infestations. This control was similar to that obtained with DNC. Later sprays of either insecticide, with the inclusion of 3 pints of spreader per 100 gal. with the DDT, at mouse-ear to pink bud, have given more variable results, the reduction of infestations ranging from about 74 to 97%. There was no evidence of any difference in effectiveness between DDT emulsion with spreader and BHC at the same concentrations. There was some evidence that DDT emulsion at 0·05% was as effective as 0·1% at bud burst. There was some evidence that 0·025% endrin emulsion at bud burst and 0·1% malathion emulsion at mouse-ear could give control equal to that given by BHC or DDT at bud burst. The comparatively inferior degree of aphid control sometimes obtained by conventional BHC and DDT sprays applied later than bud burst is sufficiently good commercially in years when aphid numbers are low or moderate, but not in years when aphid infestations are severe. [From authors' summary and conclusions.]—N.A.A.S., Wye and Reading.

1272. Madsen, H. F., and Hoyt, S. C.
The effects of spray chemicals on local dispersal of woolly apple aphid.
J. econ. Ent., 1957, **50**: 402-6, bibl. 4, illus.

The woolly apple aphid, *Eriosoma lanigerum*, creates an additional problem on the important canning variety Yellow Newtown Pippin by infesting the cores of the mature apples. Experiments were conducted in 1955 and 1956 to study the effect of chemicals on the upward and downward movements of aphids by means of trunk bands and to determine the ability of these materials to reduce core infestation. In 1955 Am. Cyanamid 12008, Thimet and Diazinon reduced aphid movements to a very low level and prevented core infestation. Trithion and Guthion were also effective, but Ryania did not give commercial control. In 1956 Thimet and Diazinon applied at 4- and 8-week intervals and Trithion at 4-week intervals were found satisfactory. Malathion was effective when applied in August.—Univ. Calif., Berkeley.

1273. Anders, F.
Neuere Auffassungen über die Reblaus-Resistenz. (**New ideas on phylloxera resistance.**)
Vitis, 1957, **1**: 142-52, bibl. 30, illus.

Gall formation on leaves and roots as a result of phylloxera attack was shown to be directly related to the rate of cell division in the pierced tissue, and was greatest in rapidly-dividing tissue. *Vitis vinifera* varieties are classed as poor gall formers, because the galls die relatively early allowing the entry of secondary infection. In American vines and 3 new selections, which are good gall formers, root growth continues almost unhampered after phylloxera attack. It is concluded that good gall-formation in a variety indicates resistance to phylloxera attack.

1274. Hofmann, E. L.
Die Histologie der Nodositäten verschiedener Rebensorten bei Reblausbefall. (**The histology of nodule-formation in various vine varieties attacked by phylloxera.**)
Vitis, 1957, **1**: 125-41, bibl. 21, illus.

The histological reactions of American *Vitis* species and their progeny and of *Vitis vinifera* varieties to phylloxera attack are described and compared, and their relation to resistance is discussed. [For earlier work see *H.A.*, 28: 319.]

1275. Rings, R. W.
Types and seasonal incidence of stink bug injury to peaches.
J. econ. Ent., 1957, **50**: 599-604, bibl. 15, illus.

Cage tests were conducted in Ohio with 14 species of stink bug to determine the types of injury they produce on peach fruits. The different types of injury were: blossom and fruit drop; catfacing or deformation; scars; gummosis; and water-soaked injury. Gummosis was the most prevalent and occurred from 42 to 115 days after flowering. A table is given showing the type of injury each insect produced and at which stage of fruit development. Only 2 species, *Euschistus tristigmus* and *E. variolarius*, are of economic importance throughout Ohio and a further 4 are important in certain areas of the state.

1276. Martelli, G. M.
Tramonto precoce dei mandorli ad opera della falsa tingide. (**Premature ageing of almond trees caused by the false tingid bug.**)
Ital. agric., 1957, **94**: 1069-74, illus.

Monosteira unicostata attacks poplar, willow and fruit trees in different Mediterranean countries. In Apulia and Sicily almonds are severely injured by it. Good control is obtained by spraying with 150 g. of DDT or 100 g. of dieldrin per hl. of water, either being effective for 8–10 days. Parathion at 50–60 g. per hl. is satisfactory, but malathion is less effective and diazinon is uneconomic. Very promising results have been given by a mixture of 4 parts of DDT and 1 of parathion, dissolved in mineral oil, the spray remaining active for 20 days.

1277. Živanović, V., and Pavićević, B.
Prilog poznavanju biologije i suzbijanja *Tropinota hirta* Poda i *Oxythyrea funesta* Poda. (**A contribution on the biology and control of *Tropinota hirta* and *Oxythyrea funesta*.**) [English summary ½ p.]
Zasht. Bilja, 1956, No. 38, pp. 43-50, bibl. 7.

The build-up of pollen beetle species was favoured by clean cultivation and dwarf fruit tree forms. Holfidal as a 1% suspension or dust gave good control when applied at full bloom, without affecting bees.—Inst. Fruit Cult., Čačak.

1278. Snapp, O. I.
Control of the plum curculio with soil insecticides.
J. econ. Ent., 1957, **50**: 457-9, bibl. 2.

In field experiments aldrin dust or granules worked into the soil under the spread of peach trees were very effective against plum curculio (*Conotrachelus nenuphar*) in its immature stages. It is considered possible to control plum curculio for 4 or more years by one soil treatment and thereby eliminate the use of an insecticide on the fruit.—Ent. Res. Div., Agric. Res. Serv., U.S.D.A.

1279. Asquith, D.
N-methyl-1-naphthyl carbamate as a killing agent for the periodical cicada.
J. econ. Ent., 1957, **50**: 696.

Sevin at 1 lb. per 100 gal. in a high volume spray gave very good immediate kill of *Magicicada septendecim* infesting apple trees.—Pa St. Univ. Fruit Res. Lab., Arendtsville.

1280. GARMAN, P.
Apple maggot control studies.
Bull. Conn. agric. Exp. Stat. **604**, 1957, pp. 20, bibl. 5, illus.

Laboratory and field studies on the use of the newer insecticides to control apple maggot [*Rhagoletis pomonella*] have been in progress in Connecticut since 1948, and are here described in some detail. In general, lead arsenate was more effective than the newer, quicker-acting insecticides in wet periods, but some of the latter gave better results in dry weather. Among insecticides tested as foliage sprays the most promising were malathion, DDT and Black Leaf 253 (parathion + DDT). Among those tried as ground cover sprays dieldrin and possibly endrin were of most value in preventing fly emergence. Depending on rainfall, desirable intervals between foliage applications in midsummer appeared to be 14 days for lead arsenate, 10 days for DDT, malathion and methoxychlor, and 7 days for TEPP and parathion. Traps proved useful in determining when to spray.

1281. STEINER, L. F., MIYASHITA, D. H., AND CHRISTENSON, L. D.
Angelica oils as Mediterranean fruit fly lures.
J. econ. Ent., 1957, **50**: 505, bibl. 3.
STEINER, L. F.
Low-cost plastic fruit fly trap.
J. econ. Ent., 1957, **50**: 508-9, bibl. 1, illus.

Angelica seed and root oils have been found very attractive to male Mediterranean fruit flies (*Ceratitis capitata*) in Florida and Hawaii, and the seed oil, impregnated on cotton, was used effectively in newly designed plastic traps. The construction and use of the trap is described in the second article.

1282. PUZZI, D., AND ORLANDO, A.
Uma nova substância atrativa à *Ceratitis capitata* (Wied.) para emprêgo nas pulverizações de iscas envenenadas. **(A new substance attractive to *Ceratitis capitata* for use in spraying poisoned baits.)** [English summary 5 lines.]
Biológico, 1957, **23**: 181-4, bibl. 3.

Hydrolysed maize liquor, a Brazilian by-product from the processing of maize foods, was much more attractive to *Ceratitis capitata* than molasses, yeast hydrolysate or the American maize by-product Sauce Base 7. There was no damage to 12 species of plant (unspecified) when the Brazilian hydrolysate was sprayed on the leaves at 2%.

1283. TASCHENBERG, E. F.
Evaluation of organic phosphorus insecticides for grape leafhopper control.
J. econ. Ent., 1957, **50**: 411-14, bibl. 9.

From 1953 to 1955 DDT and 10 phosphorus insecticides were tested for grape leafhopper, *Erythroneura comes*, control. DDT was found to perform as well as it did in 1944–1947 [see *H.A.*, 20: 1505], thus no development of DDT resistance was indicated. A single treatment before or after bloom gave adequate control throughout the growing season. Of the phosphorus compounds demeton was the best, resembling DDT in its results. In specially designed residue studies on demeton, 21 days after final application the residue on the fruit treated twice at 6 oz. of actual toxicant per acre was found to be well under the tolerance of 1·25 p.p.m.—N.Y. St. agric. Exp. Stat., Geneva.

1284. PARADIS, R. O.
Factors in the recent importance of the red-banded leaf roller, *Argyrotaenia velutinana* (Wlkr.) (Lepidoptera: Tortricidae), in Quebec apple orchards.
Rep. Que. Soc. Prot. Plants, 1956, 1957, **38**: 45-8, bibl. 11.

A survey of 30 orchards showed that, where lead arsenate spraying against codling moth had given place to DDT, roller infestation was greater owing to DDT being less effective against the larvae of the roller and highly toxic to its parasites and predators.

1285. (URQUIJO LANDALUCE, P.)
Medios de lucha contra la *Cydia pomonella*. **(Control measures against *Cydia pomonella*.)**
Rep. Inst. nac. Invest. agron. Madrid 1955–1956, 1957, p. 165.

Apple trees were sprayed 3 times at intervals of 3 weeks with various insecticides, the best control of codling moth being given by 1% Volck-lindane. Good results were given by Basudin and by 0·25% DDT, but not by 1% Volck-DDT.

1286. LOHMEYER, V. K.
DDT-resistant codling moth. Report on 1956-57 control trials.
J. Dep. Agric. S. Aust., 1957, **61**: 127-9, bibl. 2.

Malathion at 0·05%, parathion at 0·025% and diazinon at 0·025% again gave good results. [For earlier reports see *H.A.*, 26: 421 and 27: 1342.] Used one week after each flight, as indicated by lure pot catches, fewer applications were needed than when spraying was on a fortnightly schedule. Dipterex at 0·075%, trithion at 0·03% and Hercules AC528 at 0·03%, on first trial, showed much promise.

1287. COX, J. A.
The effectiveness of several insecticides and various spray programs for the control of grape berry moth.
J. econ. Ent., 1957, **50**: 455-7, bibl. 4.

In experiments during 1952 to 1956 a spray programme of 3 applications of DDT at 12 oz./100 gal. gave excellent control of grape berry moth, *Paralobesia viteana*. Split schedules of DDT and parathion, DDT and EPN or DDT and methoxychlor gave results comparable to those obtained with straight DDT. The split programmes appeared to be the more satisfactory as DDT was used only in the first 2 sprays and risks from residues at harvest were reduced. Spray programmes of 3 applications of parathion and EPN were also found very satisfactory and those of Perthane, Dilan, Diazinon and Guthion showed good promise.—Pa agric. Exp. Stat., University Park.

1288. Hibbs, E. T., and Anderson, M. A.
Wild grapes harbor first-brood moths.
Ia Fm Sci., 1957, **12**(3): 6-7, illus.

The first brood of the grape berry moth develops in wild grapes and the adults migrate to commercial vineyards. Plots receiving 4 sprays DDT between mid-June and the end of July had less infestation than any plot which had only 1 spray during this period. A single application of parathion on August 7 gave control equal to that of 4 DDT sprays.

1289. Issekutz, L.
Der Weinstockschädling *Theresimima ampelophaga* Bayle-Barelle (Lepidopt. Zygenidae). **(The vine bud moth.)** [English and Russian summaries 1 p. each.]
Acta agron. hung., 1957, **7**: 97-121, bibl. 39, illus.

The biology, ecology and control of *Theresimima ampelophaga*, which causes concern in Hungary, are discussed. For control treatment with tar-oil (1·5–2% DNOC) in early spring, before the larvae have bored into the vine buds, shows promise. New larvae emerge on the under side of the leaves from the end of June to early July, when the addition of a contact insecticide (DDT) to the normal bordeaux spray should be effective.

1290. Müller, O.
Biologische Studien über den frühen Kastanienwickler *Pammene juliana* (*Stephens*) (Lep. Tortricidae) und seine wirtschaftliche Bedeutung für den Kanton Tessin. **(Biological studies on the chestnut pest *Pammene juliana* and on its economic importance in the canton of Ticino.)** [English summary 10 lines.]
Z. angew. Ent., 1957, **41**: 73-111, bibl. 23, illus.

Although the incidence of *Pammene juliana* is high, the pest has no great economic importance at present in view of the neglected state of chestnut growing in the Ticino. Measures for chemical control are suggested and the possibility of biological control with *Bacillus thuringiensis* is envisaged.—Ent. Inst. Eidg. tech. Hochschule, Zürich.

1291. Neel, W. W.
Insecticide tests to control the hickory shuckworm on pecans.
J. econ. Ent., 1957, **50**: 507-8, bibl. 1.

Results obtained in 2 orchards in Mississippi were inconclusive, though 2 or 3 applications of EPN at 2 lb./100 gal. appeared to reduce shuckworm (*Laspeyresia caryana*) infestation appreciably in late season infestations.

1292. Vanwetswinkel, G.
La tenthrède de l'oseille (*Ametastegia glabrata*). **(Dock sawfly.)**
Fruit belge, 1957, **25**: 177-80, illus.

Larvae of dock sawfly have been found to penetrate the trunk and branches of apple trees, as well as the fruits. Recommended control measures are destruction of weeds, especially docks, and DDT or parathion sprays applied to the trees.—Centre Recherch., Gorsem.

1293. Olsson, K.
Äppelkärnstekeln. **(Apple seed chalcid.)**
Växtskyddsnotiser, 1957, **21**: 58-64, bibl. 4, illus.

The life history of and symptoms caused by *Syntomaspis varians* are described. In small-scale control trials DDT and Ekatin were applied at the beginning of July. Counts of infected fruits showed that both materials reduced infection, Ekatin being the more effective.

1294. European and Mediterranean Plant Protection Organization.
***Aspidiotus perniciosus* Comst. San José scale. Europe, Mediterranean Basin—1956.** [French and English.]
[*Publ.*] *Eur. Medit. Plant Prot. Org.*, 1957, pp. XIII+12.

The general situation with regard to San José scale infestation is described, and control or preventive measures adopted in individual countries of Europe, North Africa and the Middle East are outlined.

1295. Whitehead, V. B.
Control soft scale on apricot trees.
Fmg S. Afr., 1958, **33**(10): 41-2, illus.

Satisfactory control of scale (*Saissetia oleae*) was obtained by a winter oil spray, which could be combined with DNOC to prevent delayed foliation applied 2–3 weeks before the buds swell. Parathion and malathion were effective at the beginning of January, when the scales were at their first stage of development. —W.P. Fruit Res. Stat., Stellenbosch.

Other pests.

(*See also* 1316e, y, 1317p.)

1296. Proctor, J. M.
Carbide operated bird scarers available for the 1957 season.
Pea News Suppl. Pea Growing Res. Organ. 3, 1957, pp. 4, illus.

The Blanch Banger and the Exid Thunderbird scarers are illustrated and their action described. Regulations governing the storage and use of calcium carbide are listed, together with addresses of suppliers.

1297. Eygenraam, J. A.
Het gebruik van dierlijke teer als repellent tegen wildschade. **(Bone-tar oil as a repellent for wild animals.)** [English summary ¼ p.]
Landbouwk. Tijdschr., 1957, **69**: 811-16, illus.

A preliminary report is given on the protection of crops (including young orchards and ornamentals) from damage by hares, rabbits and deer. Protection for at least a month was obtained by surrounding the plot with hemp string soaked in bone-tar oil.—Inst. toegep. biol. Onderz. Natuur, Arnhem.

1298. Koroleva, N. I.
Protection of orchards from rodents. [Russian.]
Sad i Ogorod, 1957, No. 11, pp. 37-9.

Baits containing zinc phosphide or sodium arsenite are recommended against mice, while against hares coating the trunks with a mixture of decomposing abattoir blood and BHC was found effective.

1299. HOUGH, W. S.
Effect of mouse-control spray of endrin on insect life in orchard ground cover.
J. econ. Ent., 1957, **50**: 692-3, bibl. 1.

No evidence was obtained to indicate that the endrin-spray treatment of an apple orchard ground cover adversely affected the over-wintering stages of the unspotted leaf miner (*Callisto geminatella*) and the red-banded leaf roller (*Argyrotaenia velutinana*) or any of their Hymenopterous parasites or hyperparasites found in the ground cover, except that adults of the family Ichneumonidae may be slightly reduced in numbers. [From author's conclusion.]—Va agric. Exp. Stat., Winchester.

Spray materials and machinery.

(*See also* 1316a, c, f-h, 1317h, n.)

1300. MINISTRY OF AGRICULTURE, LONDON.
Crop Protection Products Approval Scheme, Approved List 1957, Ministry of Agriculture, Fisheries and Food (Publications), Soho Square, London, W.1, 14th edition, 1957, pp. 52.

A list of insecticides, fungicides and weedkillers marketed in Great Britain under proprietary brand names which have been officially approved by the Ministry. It contains separate alphabetical lists of groups of products, crops with recommended weedkillers, weeds with their susceptibility to herbicides, manufacturers, and a general index containing names of pests and diseases. Much ancillary information regarding methods of use, hazards, etc., is also provided.

1301. DYE, M. H.
Studies on horticultural formulations of streptomycin.
N.Z. J. Sci. Tech. Sect. A, 1957, **38**: 898-907, bibl. 9.

Three formulations and a crude preparation of streptomycin sulphate were all highly effective in preventing infection of peach leaves by *Pseudomonas syringae*, when applied as sprays at 100 and 50 µg./ml., streptomycin before inoculation. At a concentration of 10 µg./ml., disease control varied in tests on 3 different occasions, but all preparations except streptomycin sulphate were significantly effective in each test. When peach seedlings were sprayed at a concentration of 100 µg./ml., left in a glasshouse for 3 days, and then washed to remove surface deposits, infection was reduced at the 1% level of significance by all formulations up to 11 days after washing. Streptospray and Agrimycin reduced infection up to 18 days after washing. Following admixture with a number of fungicides and insecticides, there was no reduction in effectiveness of any streptomycin preparation in preventing *Ps. syringae* infection of Golden Queen peach seedlings. Observations for phytotoxicity on stone and pip fruit varieties were made on orchard trees following sprays applied during bloom and during periods of rapid growth in spring. When phytotoxicity occurred, it was most severe with colloidal streptomycin. There was little observable damage with either Agrimycin or streptomycin sulphate at the concentrations investigated. [Author's summary.]—D.S.I.R., Auckland. [See also note *H.A.*, 27: 1371h.]

1302. MELTZER, J., AND DIETVORST, F. C.
Relation between chemical structure and ovicidal and leaf penetrating properties of some new acaricides. [German summary ½ p.]
Comm. agrobiol. Lab. "Boekesteyn", 's-Graveland **48**, 1957, pp. 9, bibl. 9.

The ovicidal properties of sulphur-linked diphenyl compounds have been tested on *Tetranychus urticae*. There was little difference in final egg kill between the sulphone (Tedion), sulphoxide and sulphide homologues of the 2,4,5,4′-tetrachloro derivatives. The sulphone had the strongest direct contact action, but it was slowest to penetrate dwarf bean leaves. Leaf penetration of p-chlorophenyl benzene sulphonate and chlorbenside was faster than that of Tedion so that the latter appears to have a longer residual action. [See also *H.A.*, **26**: 403.]

1303. MELTZER, J.
Insektizide und akarizide Wirksamkeit von 2,4,5,4′-Tetrachlor-Diphenyl-Sulphon (Tedion). **(The insecticidal and acaricidal action of Tedion.)** [English summary 18 lines.]
Z. angew. Ent., 1957, **41**: 58-63, bibl. 3.

Tedion was shown to be a specific acaricide with no insecticidal action. The chemical was also found to be practically non-toxic to mammals (mice and rats). —Agrobiol. Lab. "Boekesteyn", 's-Graveland, Netherlands. [See also *H.A.*, 26: 445n.]

1304. WILCOX, J., AND HOWLAND, A. F.
Tests with Thimet on strawberries and turnips.
J. econ. Ent., 1957, **50**: 703-4.

Strawberry plants, in a study conducted in southern California, were infested with two-spotted spider mite (*Tetranychus telarius*), green peach aphid (*Myzus persicae*), bean aphid (*Aphis fabae*) and a *Macrosiphum* sp. Turnip plants were infested with turnip aphid (*Rhopalosiphum pseudobrassicae*) and green peach aphid. The systemic insecticide Thimet at ½ and 1 lb./a. sprayed into furrows near the strawberry plants gave excellent control of both aphids and mites for 2 months and avoided residue hazard. Against the aphids on turnips Thimet was most effective when applied at 4 lb./a. in granulated form before sowing in November or in furrows 2 months later.

1305. WEIDHAAS, D. E.
Adsorption of DDT, methoxychlor and some related compounds on insecticide dust diluents and carriers.
J. econ. Ent., 1957, **50**: 429-35, bibl. 9.

The interaction of 5 commercially available diluents, each representing a different mineral group, with 5 insecticides was studied.

1306. KOULA, V., DŮRASOVÁ, M., AND KOŘENSKÝ, F.
Ruční pulsační generátor v boji proti škůdcům zeleniny a ovocného stromoví. **(The use of a hand-operated generator in pest control of vegetables and fruit trees.)** [Russian and English summaries 6 and 7 lines respectively.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1957, **30**: 1019-24, bibl. 2, illus.

Smokes of DDT plus BHC or DDT alone gave effective control of *Ceuthorhynchus quadridens*, *Phyllotreta atra* and *Chortophila brassicae* on vegetables, and of *Anthonomus pomorum*, *Malacosoma neustrium*, *Operophtera brumata*, *Rhagoletis cerasi*, *Euproctis chrysorrhosa*, *Yponomeuta padella*, and *Enarmonia pomonella* on fruit trees.

1307. ANON.
Un nuovo potente mezzo per la distribuzione degli antiparassitari. **(A new powerful spray.)**
Inf. fitopat., 1957, **7**: 314-15, illus.

The apparatus, carried on a small lorry or in an aircraft, throws jets of liquid or powder to a distance of up to 150 m. It is of French manufacture and is particularly effective for control of grasshoppers and cockchafers, and for spraying olive groves with parathion. Droplet size can be controlled over a 1–200 μ range and penetration among dense foliage is great, owing to the pulsatory nature of the expulsive force. The tanks are loaded by suction, and bran can be automatically mixed with insecticides and spread as bait.

1308. HARONSKA, G.
Zur Anwendung von Rückensprühgeräten. **(The use of knapsack sprayers.)** [English summary 7 lines.]
Z. PflKrankh., 1957, **64**: 676-9, illus.

The optimum concentrate spray distribution on a spindle-bush tree was calculated in relation to total leaf area at different heights above ground level. These figures were compared with the actual spray distribution obtained using knapsack sprayers with and without a pump. With both types of apparatus the variation between practical and theoretical values reached about 7·5%.

Spray damage and residues.

(*See also* 1316i, 1317h, q.)

1309. BOSCH, E.
Untersuchungen über die Ursachen der Berostungen auf der Fruchtschale der Äpfel. **(Studies on the causes of russeting on the skin of apple fruits.)** [English summary 1 p.]
Phytopath. Z., 1957, **30**: 429-48, bibl. 7, illus.

The effects of several plant protective sprays on apple fruits (mainly Golden Delicious) have been observed. Emulsions of parathion, malathion and diazinon caused typical ring russeting, but in suspension form only parathion and diazinon caused russeting. Glyodin or zineb sprays applied alone did not induce russeting on Golden Delicious and Starking fruits. Slight russeting resulted from combination sprays of glyodin or zineb with phosphoric acid esters, but there was no russeting after applications of lead arsenate with zineb or glyodin. The effects of organic fungicide sprays varied according to the apple variety. —Siegfried AG., Zofingen, Switzerland.

1310. ANDERSON, E. J., SHAW, F. R., AND SUTHERLAND, D. J.
The effects of certain fungicides on honey bees.
J. econ. Ent., 1957, **50**: 570-3, bibl. 4, illus.

In tests in Massachusetts and Pennsylvania glyodin, fermate, Puratized, captan and sulphur did not cause any serious mortality to bees. Michigan workers have reported Puratized to be toxic [see *H.A.*, 27: 1356] and glyodin somewhat less so.

1311. KÖNIGER, M., AND OBERMAYER, G.
Verbesserter Nachweis kupferhaltiger Spritzbeläge auf Pflanzen. **(An improved method of determining copper spray coverage on plants.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1957, **9**: 171-2, bibl. 2, illus.

An improvement in the method described in an earlier paper [*H.A.*, 22: 1481] makes it possible to take a series of imprints of sprayed leaves in the field.

1312. BENGSTON, M., AND WINKS, W. R.
Studies of arsenic spray residues on apples.
Qd J. agric. Sci., 1957, **14**: 73-80, bibl. 2.

The results of trials in Queensland indicate that lead arsenate is not weathered appreciably from the fruit, the decrease as p.p.m. being largely due to fruit growth. A 3 lb./100 gal. spray applied at 1¼ gal. per tree in late November left residues of less than 0·6 p.p.m. in early January, but a double strength spray left 1·46 p.p.m. mean residue. Lead arsenate sprays should not be used after early November.

1313. STONE, H. M., CLARK, P. J., AND JACKS, H.
Mercury content of apples.
N.Z. J. Sci. Tech. Sect. B, 1957, **38**: 843-8, bibl. 6.

Determinations of mercury were made on untreated apples and on apples treated with phenyl mercuric sprays. Measurable amounts of mercury were found in both the skin and the pulp of untreated apples. The total mercury content of the skin and the pulp of treated apples ranged from 0·011 p.p.m. to 0·135 p.p.m. When applications ceased at closed calyx stage, the total mercury was generally below 0·05 p.p.m. It is suggested that 0·05 p.p.m. would be a practicable tolerance limit for total mercury. The health aspect is outside the scope of this paper. [Authors' summary.]—D.S.I.R., Auckland.

1314. BLINN, R. C., AND OTHERS.
Harvest residues of schradan in meats of field-treated walnuts.
J. econ. Ent., 1957, **50**: 500-1, bibl. 3.

Residues in walnut meats from schradan applied to mature trees in May, July and/or August at 1 and 2 lb. per acre were well below 1 p.p.m.—Citrus Exp. Stat., Riverside.

1315. LICHTENSTEIN, E. P.
DDT accumulation in Mid-Western orchard and crop soils treated since 1945.
J. econ. Ent., 1957, **50**: 545-7, bibl. 7.

In soil analyses made in 1955 the largest amounts of DDT were recovered from apple and peach orchard soils where high volume sprays had been used for in some cases as long as 10 years. The average recovery for 14 orchards was 26·6% of the total amounts applied and 237·0% of the average yearly application. Vegetable and other crop soils showed lower residues; the average recovery from 24 crop soils was 15·5% of the total applied and 61·2% of the average yearly application. The type of crop did not appear to affect soil residues. Turf plots treated with one application of DDT in 1945 contained 10·9–17·9% of the original application in 1955.—Univ. Wisconsin, Madison.

Noted.

1316.

a de Almeida, P. R.
Diazinon—novo inseticida fosforado. **(Diazinon—a new phosphorus insecticide.)**
Biológico, 1957, **23**: 131-6, bibl. 6.

b Anon.
État actuel de la lutte contre la mouche des fruits. **(The present position in the control of mediterranean fruit fly.)**
Rev. hort. Algér., 1957, **61**: 226-30.
See also *H.A.*, 27: 2311.

c Anon.
Fruit spraying programme.
Leafl. N. Scot. Coll. Agric. **35**, 1958, pp. 7.
Recommendations for pome, stone and small fruits.

d Borzini, G.
Considerazioni sulle irroratrici a basso volume in fitoiatria. **(Observations on low-volume spray equipment for plant treatment.)**
Inf. fitopat., 1957, **7**: 254-7, illus.
Knapsack and tractor-propelled types for fruit trees of different heights and shapes.

e Bösenberg, K.
Ursachen gelegentlicher Misserfolge bei der Sperlingsvergiftung. **(Causes of occasional failure in sparrow poisoning.)** [English and Russian summaries ¼ p. each.]
NachrBl. dtsch. PflSchDienst. Berlin, 1957, **11**: 155-8, bibl. 1.
Lack of co-operative control, use of old bait, and unfavourable weather.

f Branzanti, E. C.
Le nuove macchine per irrorare i frutteti. **(New machines for spraying orchards.)**
Ital. agric., 1957, **94**: 1136-48, illus.
All sorts of machines, big and small, for diverse purposes.

g Bredell, C. H.
Spray machinery for orchards.
Dec. Fruit Gr, 1957, **7**: 296-8, illus.
Power, air blast and concentrate sprayers discussed.

h Burchfield, H. P., and Goenaga, A.
Equipment for producing simulated rain for measuring the tenacity of spray deposits to foliage.
Contr. Boyce Thompson Inst., 1957, **19**: 133-40, bibl. 9, illus.

i Burchfield, H. P., and Goenaga, A.
Some factors governing the deposition and tenacity of copper fungicide sprays.
Contr. Boyce Thompson Inst., 1957, **19**: 141-56, bibl. 10.
Bordeaux, etc., tested on banana and castor bean leaves.

j Buxton, E. W.
Problems of plant wilt diseases.
Agric. Rev. Lond., 1957, 3(7): 28-35, bibl. 15, illus.
Control by cultural methods and production of resistant varieties.

k Carlone, R.
I danni del freddo del febbraio 1956 sulle piante da frutto e possibili rimedi. **(Damage to fruit trees by the frost of February 1956 and possible remedial measures.)**
Reprinted from *Coltiv. G. vinic. ital.*, 1956, No. 5, pp. 8.
Varietal susceptibility noted in apricots and peaches.

l Darrow, G. M., McGrew, J. R., and Scott, D. H.
Reducing virus and nematode damage to strawberry plants.
Leafl. U.S. Dep. Agric. **414**, 1957, pp. 8, illus.
Raising and maintaining virus-free and nematode-free stock.

m Domes, R.
Eine Abbauerscheinung bei der Erdbeersorte Madame Moutot. **(Symptoms of degeneration in the strawberry variety Madame Moutot.)**
Phytopath. Z., 1957, **31**: 113-22, bibl. 10, illus.
Due to 2 virus diseases.

n Domes, R.
Blattschäden an *Fragaria vesca* L. durch *Phyllocoptes* spez. **(Leaf injuries to *Fragaria vesca* by *Phyllocoptes* sp.)** [English summary 8 lines.]
Reprinted from *Z. ang. Ent.*, 1957, **40**: 522-7, bibl. 21, illus.
Leaf symptoms suspected of being caused by a virus were found to be due to *Phyllocoptes* sp.—Inst. f. Obstbau, Heidelberg.

o Geard, I. D.
Diseases of strawberries.
Tasm. J. Agric., 1957, **28**: 383-8, bibl. 5, illus.
Virus, fungus and non-parasitic diseases and their control.

p Gerritsen, J. D.
Nachtvorstbestrijding door middel van beregening. **(Night frost control by sprinkler irrigation.)**
Fruitteelt, 1958, **48**: 60-2, illus.
Experience with apples in the experimental garden at Geldermalsen.

q Gjaerum, H. B.
Sekksporemodning, spreiing og infeksjon hos epleskurv. **(Ripening of ascospores and spread of apple scab infection.)** [English summary ½ p.]
Meld. Stat. Plantevern **13**, 1957[?], pp. 48, bibl. 57.
Five years' scab studies under Norwegian conditions, including timing of sprays.

r Groves, A. B.
Root diseases of deciduous fruit trees.
Bot. Rev., 1958, **24**: 25-42, bibl. 70.
A review, including control measures.

s Hayashi, S., and Wakisaka, I.
Studies on "yuzuhada" disorder of fruits of Nijisseiki pear (*Pyrus serotina*). (III) Histological observations of the affected fruits. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1957, **26**: 178-84, bibl. 14, illus.
Black-end disorder. [For part II see *H.A.*, 27: 264.]

t Heggli, M.
Junigulsjuke ("June yellows") på jordbaer. (**June yellows of strawberries.**) [English summary 16 lines.]
Forskn. Landbruk, 1957, **8**: 369-75, bibl. 13.
The mildness of the disorder in Norway thought to be due to the short, warm spring.

u Hill, A. R.
Observations on the reproductive behaviour of *Amphorophora rubi* (Kalt.), with special reference to the phenomenon of insect resistance in raspberries.
Bull. ent. Res., 1957, **48**: 467-76, bibl. 10.
Including data on the resistance of 16 raspberry varieties representing 4 *Rubus* spp.

v Jacob, F. H.
Some modern problems in pest control.
Sci. Progr., 1958, **46**: 30-45, bibl. 93.
Insecticides and the balance of nature, resistance to insecticides, and toxic hazards.

w Jacoboni, N.
Effetti del gelo in Umbria. (**Effects of frost in Umbria.**)
Ann. Fac. Agrar. Perugia, 1956, **12**: 274-88, illus., [received 1958].
Damage to olives, vines and peaches is described and illustrated by photomicrographs. Remedial pruning and manuring are outlined.

x Jensen, D. D.
Transmission of peach yellow leaf roll virus by *Fieberiella florii* (Stål) and a new vector, *Osbornellus borealis* DeL. and M.
J. econ. Ent., 1957, **50**: 668-72, bibl. 19.

y van Koersveld, E.
Damage to crops by birds and mammals, and methods for the prevention of such damage.
Meded. Inst. toegep. biolog. Onderz. Nat. **32**, 1957, pp. 9-71.
A review.

z Kriegler, P. J.
The choice of control measures against the red spider.
Dec. Fruit Gr, 1957, **7**: 294-6, illus.
The pros and cons of the newer acaricides.

1317.

a López Cristóbal, U.
Recrudecimiento de la forma radicícola del pulgón lanígero del manzano (*Eriosoma lanigerum* Hausmann). (**Recrudescence of the root-infesting form of woolly aphid *(Eriosoma lanigerum)* on apple trees.**)
Rev. Fac. Agron. La Plata, 1956, **32**: 211-13, illus.
Found on Northern Spy and Huidobro apple rootstocks, previously regarded as resistant.

b Michelbacher, A. E.
Spider mite on walnuts.
Calif. Agric., 1957, **11**(11): 11.
Kelthane, Trithion and Nialate effective against European red mite [*Metatetranychus ulmi*].

c Miles, H. W.
Apple scars and blemishes.
J. roy. hort. Soc., 1957, **82**: 513-19, illus.
How to identify the various causes.

d Ministry of Agriculture, London.
Cutworms.
Adv. Leafl. Minist. Agric. Lond. **225**, revised 1957, pp. 4, illus.
Control of *Agrotis* spp., *Triphaena pronuba*, *Euxoa nigricans*.

e Oostenbrink, M., s'Jacob, J. J., and Kuiper, K.
Over de waardplanten van *Pratylenchus penetrans*. (**Host plants of *Pratylenchus penetrans*.**) [English summary 2 pp.]
Tijdschr. PlZiekt., 1957, **63**: 345-60, bibl. 12, illus.
Responses of a wide range of horticultural crops in infested soil. [See also *H.A.*, 28: 291.]

f Ostojić, N.
Uporedna vrednost organskih i neorganskih fungicida pri suzbijanju plamenjače vinove loze. (**Studies on the control of vine downy mildew by copper-containing and organic fungicides.**) [German summary ½ p.]
Zasht. Bilja, 1956, No. 38, pp. 21-31, bibl. 15.
Good control by 1·5% and 2% bordeaux, captan and zineb.

g Parent, B.
Emploi de malathion pour la repression du pique-bouton du pommier, *Spilonota ocellana* (D. & S.), dans le Québec. (**The use of malathion against the eye-spotted bud moth of apple trees, *Spilonota ocellana* (D. & S.) in Quebec.**) [English summary 6 lines.]
Rep. Que. Soc. Prot. Plants, 1956, 1957, **38**: 56-61, bibl. 10.
Malathion and parathion gave highly effective control.

h PEASE, H. L.
Determination of dithiocarbamate fungicide residues.
J. Ass. off. agric. Chem. Wash., 1957, **40**: 1113-18, bibl. 2.
On fruit and vegetable crops.

i PERRAUDIN, G., FAVRE, C., AND JENNY, J.
Importance du choix des arroseurs dans la lutte contre le gel par aspersion. (**The importance of choice of sprinkler for frost control by irrigation.**)
Rev. romande Agric. Vitic., 1957, **13**: 110-11, illus.
Based on coverage, droplet size, regularity of supply and durability of the regulator mechanism.

j RIPPER, W. E.
Spraying of crops by helicopter.
Reprinted from *Trans. Soc. Engrs*, June 1955, pp. 33-54, bibl. 27, illus.
Types of sprayer, equipment and economics discussed.

k SAVARY, A., AND BAGGIOLINI, M.
Contribution à l'étude de la lutte contre le carpocapse des pommes et des poires (*Enarmonia pomonella* L.). (**A contribution to the study of codling moth control in apples and pears.**) [German, English and Italian summaries 9–14 lines each.]
Landw. Jb. Schweiz, 1957, **6**: 809-26, bibl. 10.
Concerns economies in spraying brought about by observation of emergence and oviposition in combination with temperature readings at dusk.

l STOREY, I. F.
Recent experiences in the control of apple scab.
Agriculture, Lond., 1957, **64**: 454-8, bibl. 2.
A survey of modern methods.

m TADIĆ, M., AND VASILJEVIĆ, L.
Laboratoriski rezultati ispitivanja patogenog dejstva nekih bakterija na jabučnog smotavca. (**Laboratory studies on the pathogenic effect of some bacteria on *Carpocapsa pomonella*.**) [English summary 1 p.]
Zasht. Bilja, 1956, No. 38, pp. 71-5, bibl. 8, illus.
A *Bacillus* sp. isolated from *Cicada plebeia* and *Bacillus thuringiensis* did not give biological control of codling moth larvae.—Inst. Pl. Prot., Belgrade.

n TOBE, Y.
Quantitative determination of the effective component contained in aerosols of BHC smoke fumigants. [Japanese, with English summary ½ p.]
Botyu-Kagaku, 1957, **22**: 293-6, bibl. 4, illus.

o WEBER, G.
Eine Fruchtnekrose der Süsskirsche. (**A fruit necrosis of sweet cherry fruit.**)
NachrBl. dtsch. PflSchDienst., Braunschweig, 1957, **9**: 179-81, bibl. 9, illus.
Caused by a virus disease for which the author proposes the temporary designation "Ockstädter Fruchtnekrose".

p WOODS, J. J., AND HARRIS, J. H.
Protecting crops from deer.
[*Mimeo.*] *Publ. Domin. exp. Fm, Saanichton, B.C.* **167**, 1957, pp. 8, illus.
By shooting, noisy devices, repellents and fences.

q ZANARDI, D.
Azione tossica su alcune cultivar di pero da parte dello zineb. (**Toxicity of zineb to certain pear varieties.**) [English summary ½ p.]
Not. Mal. Piante, 1957, No. 42, pp. 51-6, bibl. 1, illus.
Out of 20 pear varieties treated, only Armela and Spadona d'Estate were damaged by 0·3% zineb.

WEEDS AND WEED CONTROL.

General.

(*See also* 1072, 1368f, h, l, m.)

1318. CONLEY, C. C., AND PETERSON, I. L.
Use of geese for grass control.
Calif. Agric., 1957, **11**(11): 12, illus.

In recent years increasing use has been made in California of geese to clean fields of perennial grasses, such as Johnson, Bermuda and nutgrass. Among crops for which they have been used are asparagus, beans, beets, onions, hops, strawberries and other small fruits, vines, and roses and other nursery stock. Under grassy conditions in row crops 3 or 4 geese per acre will be adequate in the first year and 2 in the second. The management of geese under these conditions and certain economic aspects are discussed briefly.—Merced County, Univ. Calif.

1319. LANING, E. R., AND OTHERS.
Weeds in fruit, vegetables and row crops.
Res. Progr. Rep. west. Weed Control Conf., 1956, pp. 52-79.

Twenty-two reports submitted provide information on weed control in various kinds of beans, melon, onion, pea, beetroot, black and red raspberries, vine and some field crops.—From *Weed Abstr.*, **6**, No. 1720.

1320. LANING, E. R., AND OTHERS.
Weeds in fruits, vegetables and row crops.
Res. Progr. Rep. west. Weed Control Conf., 1957, pp. 67-87.

This section comprises 18 reports dealing with weed control in crop plants of which the following are of horticultural interest: red beet, pole bean, broccoli, cauliflower, lettuce, tomato, cucumber, squash, melon, celery, pea, strawberry, iris, daffodil and tulip. The reaction of both crops and weeds to the very numerous herbicides used are reported.—From *Weed Abstr.*, **6**, No. 1976.

Herbicides.

(*See also* 1300, 1368g, o.)

1321. Puttarudriah, M.
Weedicides.
Mysore agric. Calendar, 1956–57, 1957, pp. 121-2.

Preliminary results comparing the action of hormone herbicides and TCA are reported. Nutgrass (*Cyperus rotundus*) and Bahama grass (*Cynodon dactylon*) were most resistant, but dusting with TCA gave very promising results. Wild garlic, very resistant to most treatments, was controlled by TCA or by 2,4-D sodium salt.

1322. Verona, O., and Bozzini, A.
Effetti prodotti da un composto volatile del 2,4-D su alcune piante. **(Effects of a volatile 2,4-D compound on certain plants.** [English summary 6 lines.]
Ann. Sper. agrar., 1957, **11**: 1311-17, illus.

A herbicide containing 44% of the isopropyl ester of 2,4-D, used on a gravel walk, produced dwarfing and various malformations of leaves and death of young fruit in vines 3–8 m. distant. Young foliage of plane trees was affected at a distance of 30–40 m. and that of walnut at 10 m. Boxwood bordering the area was severely damaged. Ivy was damaged at 2 m., rose plants at 4–6 m. and Japanese privet (*Ligustrum japonicum*) at 7–10 m. Other plants affected were *Sophora japonica*, *Wisteria chinensis* and Virginia creeper (*Parthenocissus quinquefolia*). In sycamore and *Negundo aceroides* fruits as well as leaves were dwarfed and malformed and some parthenocarpy was apparent.

1323. Zedler, R. J., and Keays, J. W.
"Crag" Mylone, 85W, a new temporary soil sterilant.
Proc. 10th south. Weed Conf., 1957, pp. 193-203, bibl. 6.

The authors describe some experiments and data similar to those reported earlier [see *H.A.*, 27: 3342] and give the following additional information. Mylone at 300 lb./ac. did not injure rooted chrysanthemum cuttings planted 23 days after treatment and compared well with other soil fumigants for the control of *Digitaria sanguinalis* and *Cyperus* spp., particularly when the plots were covered with "Kraft" paper after treatment. A list of weeds controlled by the compound, the technique of application and the presumed mode of breakdown in the soil are given.—From *Weed Abstr.*, **6**, No. 1924.

1324. Bengtsson, A.
Untersuchungen über den Einfluss der Tropfengrösse auf die Wirkung zweier selektiver Unkrautmittel. **(Effects of droplet size on the activity of 2 selective herbicides.)**
Summ. Pap. 4th int. Congr. Crop. Prot., 1957, pp. 67-8.

The herbicides were MCPA (sodium) and dinoseb, the droplet sizes 80, 150 and 380 μ. With MCPA it was found that at constant volume decreasing the droplet size increased the effect on certain species, particularly those of which the leaves are difficult to wet, or with sprays of high surface tension. Dinoseb sprays were always more active when smaller droplets were used.—*Weed Abstr.*, **6**, No. 1860.

1325. Hull, H. M., and others.
Chemical and physiological studies.
Res. Progr. Rep. west. Weed Control Conf., 1957, pp. 95-105, bibl. 3.

The 9 reports presented deal with penetration and translocation of herbicides, and effects of soil types on toxicity and decomposition.—From *Weed Abstr.*, **6**, No. 2092.

1326. Schneider, G.
Über Versuche mit synthetischen grenzflächenaktiven Stoffen als Zusatzmittel bei der chemischen Unkrautbekämpfung. **(On experiments with synthetic surface-active materials as additives in chemical weed control.)**
NachrBl. PflSchDienst., Braunschweig, 1957, **9**: 183-9, bibl. 41, illus.

Two additives, alkylbenzenesulphonate+alkylsulphate and alkylbenzenesulphonate+aliphatic alcoholethyleneoxide condensate, were found to accelerate and enhance the action of herbicides against certain weeds. This was especially true in the case of plants that were difficult to wet and in combination with 2,4-D and TCA. The selectivity of the herbicides may, however, be affected by the admixture. A study of the action of the additives showed that they promote wetting, infiltration and translocation and that they injure the protoplasm.—Bot. Inst., Univ. Giessen.

Control of aquatic weeds.

(*See also* 1368b, d, k.)

1327. Swingle, H. S.
Control of pond weeds by the use of herbivorous fishes.
Proc. 10th south. Weed Conf., 1957, pp. 11-17, bibl. 20.

A discussion on 11 species of fish which feed on filamentous algae and rooted aquatics and are of promise for the biological control of pond weeds.—From *Weed Abstr.*, **6**, No. 1738.

1328. Arle, H. F., and others.
Aquatic weeds; submersed and emergent.
Res. Progr. Rep. west. Weed Control Conf., 1957, pp. 89-93.

Five reports are summarized. Against *Carex aquatilis* amino triazole at 3–20 lb./ac. was the best of several compounds tested. Cattail [*Typha* spp.] and willows [*Salix* spp.] at the edges of ponds were controlled by chopping to ground level and treating with monuron at 80 lb./ac. in the autumn before winter rains commence. Narrow leaved cattail [*Typha angustifolia*] treated with 2,3,6-TBA at 4–16 lb./ac. and amino triazole+MCPA in June showed no regrowth 13 weeks later.—From *Weed Abstr.*, **6**, No. 1978.

1329. COLEMAN, P. G.
The chemical control of water hyacinth in Kelantan.
Malay. agric. J., 1957, **40**: 200-8, bibl. 3, illus.

Water hyacinth was economically eradicated over 65–70 acres at a cost of $99–106 (Malay) per acre by hand spraying from boats using Triozone (now Floroxone, 2,4-D+2,4,5-T) at 6 lb. acid equivalent per 80 gal. per acre. A second spraying 3–4 weeks later was necessary. No fish deaths were observed as relatively little spray fell in the water.

Control of particular weeds.

(*See also* 1368c, e, n.)

1330. LEA, J. D.
The effect of ring-barking and 2,4,5-T applied as a bark paint on *Acacia seyal* Del.
E. Afr. agric. J., 1957, **23**: 89-90.

In field trials in the Sudan an almost pure stand of *Acacia seyal* was effectively killed by ring-barking, but a 2% solution of 2,4,5-T applied as a bark paint was less effective. Clearing may be effected by felling and burning in the second dry season after ring-barking.

1331. O'NEIL, J. M.
Colocynth (*Citrullus colocynthis*, Schrad).
J. Dep. Agric. S. Aust., 1957, **61**: 133-5, illus.

This is a proclaimed weed in S. Australia and parts of Victoria. It is reputedly poisonous and difficult to eradicate. 2,4-D applied to young growth is effective.

1332. MINISTRY OF AGRICULTURE, LONDON.
Bindweeds.
Adv. Leafl. Minist. Agric. Lond. **450**, 1957, pp. 3, illus.

A description is given of bindweed, *Convolvulus arvensis*, and of *Calystegia sepium* and *C. sylvestris*, both known as larger bindweed. For control removal or exhaustion of the root system, prevention of seedling establishment and treatment with growth regulators, especially 2,4-D, are recommended.

1333. GREENHAM, C. G., AND BROWN, A. G.
The control of mistletoe by trunk injection.
J. Aust. Inst. agric. Sci., 1957, **23**: 308-18, bibl. 17.

Injections of the triethanolamine salt of 2,4-D into the trunks of host trees (Eucalyptus) killed 70–100% of mistletoe (*Amyema pendula*) with the loss of some 5% of the hosts.

1334. ANON.
Il vischio: dove, come cresce? **(Mistletoe: where and how does it grow?)**
Inf. fitopat., 1957, **7**: 266-7, illus.

Cultivation is very briefly outlined and eradication from weakened hosts is described. After cutting away affected branches to remove the entire absorbing system of the mistletoe, wounds are treated with 20% ferrous sulphate or with 15–20% copper sulphate and sealed with mastic.

Weed control in fruit crops.

(*See also* 1319, 1320.)

1335. DETROUX, L., DERMINE, E., AND MONIN, A.
Essai de désherbage chimique en culture fruitière. **(Chemical weed control for fruit.)**
Fruit belge, 1957, **25**: 145-52, illus., and *Rev. Agric. Brux.*, 1958, **11**: 229-47, bibl. 11, illus.

Plots of young dwarf apple trees were given several herbicidal treatments, and the effects on weeds, trees and cover crops were noted. The best results were obtained with Simazin (2 chloro-4 bis (ethylamino) 1 triazine) at 2 kg./ha., and with DNOC at 50 l./ha.—Stat. Phytopharm., Gembloux, and Stat. Plantes fruit. maraîch., Grand-Manil.

1336. TREVETT, M. F.
Bayberry control in lowbush blueberry fields with 2,4,5-T.
Me Fm Res., 1957, **5**(3): 8-10.

The esters of 2,4,5-T can be as injurious to blueberry as to bayberry [*Myrica carolinensis*], and the following recommendations are given for control. For spot treatments of scattered clumps of bayberry, sprays of 4,000 p.p.m. 2,4,5-T should be applied during mid-to-late June or July. For widespread bayberry, spot treatment with 2,4,5-T at the same strength should be applied after the blueberry leaves have turned red, but before the bayberry leaves have dropped. In a 2-year burn cycle spraying is done in the autumn of the crop year, and in a 3-year burn cycle in the second crop year.

1337. ROACH, F. A.
The use of 2,4-DES to control weeds in strawberries.
Exp. Hort., 1957, No. 1, pp. 28-33.

Trials carried out with 2,4-DES since 1952 in the South-Western Region are reported. Results have shown that 2,4-DES applied at 5 lb./acre a few days after cultivation will give commercial control of most annual weeds. Good control has sometimes been obtained with 2½ lb./acre. Provided the soil is adequately covered, 50 gal. per acre has given as good results as 100 or 200 gal. per acre. No serious damage to strawberry plants has been observed in these trials but some injury has been reported by growers, especially to plants under cloches. Until further experience has been obtained the use of 2,4-DES on runner beds should be on an experimental scale.—N.A.A.S., Bristol. [See also *H.A.*, 27: 3353.]

1338. PARKER, M. M., AND DANIELSON, L. L.
Effect of pre-application spraying of strawberry mulches with herbicides.
Veg. Grs' News, 1955, **10**(3): 1-3, illus.

Spraying of various winter mulches for Pocahontas strawberries with 2,4-DES 2 lb./ac.+CIPC 1 lb./ac. before spreading on beds controlled winter weeds, e.g. chickweed [*Stellaria media*] and henbit [*Lamium amplexicaule*], and spring weeds such as knotweed [*Polygonum aviculare*] and lambsquarters [*Chenopodium album*). Yield and berry size were not materially affected. The mulches, which consisted of pine straw, wheat straw, wood shavings, peanut hulls and ground maize cobs, were chopped into short lengths by a silage cutter, measured out in quantities for the different plots at a rate of ca. 600 bushels/ac. (i.e. so as to give a covering of about 2 in.), sprayed, and applied about 3 weeks after planting. Because they contain seed, grain straws are not recommended as mulches.—*Weed Abstr.*, **6**, No. 1718.

1339. ZANARDI, D.
Prove di diserbo dei vigneti con aminotriazolo. **(Vineyard weed-control tests with aminotriazole.)** [English summary 5 lines.]
Not. Mal. Piante, 1957, No. 42, pp. 143-9, bibl. 10, illus.

Grass and other weeds were satisfactorily controlled by spraying under and between vines with aminotriazole at 4, 8 or 16 kg. per ha. The vines were undamaged in all treatments and the best results were obtained by applying the lowest concentration of the product immediately after cutting the weeds. When used at 2 kg. per ha. a single treatment gave only very temporary control.

1340. KONLECHNER, H.
Versuche mit Selektiv-Herbiziden zur Unkrautbekämpfung im Weinbau. **(Trials with selective herbicides for the control of weeds in vineyards.)** [English, French and Spanish summaries 4–5 lines each.]
Mitt. Klosterneuburg, *Ser. A*, 1958, **8**: 27-30, bibl. 3, illus.

A single application of CMU or sodium 2,4-dichlorophenoxyethyl sulphate, made on clean, freshly cultivated soil, suppressed all weeds in vineyards except bindweed which, however, was clearly weakened by the treatment.

Weed control in ornamentals.

1341. CHAPPELL, W. E.
The use of granular herbicides in azaleas.
Proc. 10th south. Weed Conf., 1957, pp. 105-7, bibl. 1.

Uniform beds of 1-year-old azaleas were treated with CIPC 2–8 lb./ac., dinoseb 4·5–9 lb./ac. or PCP 20–40 lb./ac. in May or June. All herbicides were applied from a hand-duster after incorporation with a known volume of vermiculite. In these experiments only the higher rates were fully effective for weed control, and azaleas which recieved even a further 1 or 2 later applications showed no injury in November. In autumn the best treatments for weed control and no crop injury were CIPC 8 lb./ac., diuron 2 lb./ac., 2-chloro-4,6-bis (diethylamino)-s-triazine 4 lb./ac., and Vegadex (CDEC) 8 lb./ac.—*Weed Abstr.*, **6**, No. 1725.

1342. BLASZYK, P.
Zur chemischen Unkrautbekämpfung im Blumenzwiebelbau. **(Chemical weed control in bulb growing.)**
Gartenwelt, 1958, **58**: 10-11, 23-4, bibl. 1, illus.

CIPC sprays applied to tulips when 3–10 cm. high gave satisfactory weed control until the bulbs were lifted. Leaves infected with *Botrytis* and those no longer upright were most susceptible to scorching by the herbicide. No effects on forcing qualities or yields were observed. Neither narcissus nor crocus crops were damaged by CIPC applications. A rate of 6–8 l./ha. of 50% material was most satisfactory, and should be applied after removal of the straw covering. Results with simazin application to tulips were not satisfactory.

1343. ANON.
Recommendations for gladiolus weed control.
Flor. Exch., 1957, **129**(15): 48.

Alanap No. 3 applied as a spray or in granular form has given good weed control in gladiolus plots. Applications should be given immediately after planting and before the first irrigation. Weeds that have already sprouted before gladiolus emergence may be controlled by a contact herbicide.—Alameda, Calif.

1344. DUSTAN, A. G.
Chemical control of weeds in lily fields.
Agric. Bull. Bermuda, 1955, **25**(1): 1.

Monuron 1·5 lb. in 200 gal. water/ac. should be applied to lilies in the early autumn as the first crop of weeds is emerging. It may safely be applied on growing lilies and if necessary a second application of 3 lb./ac. may be made in January.—*Weed Abstr.*, **6**, No. 1969.

1345. AKAMINE, E. K., AND NAKASONE, H. Y.
Control of weeds in orchid culture.
Hawaii Fm Sci., 1957, **6**(2): 11-12, illus.

CMU was the only herbicide tested which controlled common weeds of orchids without phytotoxic effects on most of the genera studied. A single application of CMU at 5 to 6 mg. per 4- or 6-inch pot gave effective weed control for almost a year.

Weed control in pyrethrum.

1346. KROLL, U.
Weed control in pyrethrum.
Pestic. Abstr. News Summ., Sect. C, 1958, **4**: 11-17.

Two trials were carried out at the Pyrethrum Station, Molo, in 1957. In the first one 11 herbicides were applied to established pyrethrum and in the second 8 compounds were used on cultivated land prior to planting the crop. Notes are given on the effect of each treatment. Most of the compounds which gave an efficient control of weeds were harmful to pyrethrum, reducing flower yields and in several cases the content of pyrethrins. Monuron, simazin and Monoxon (sodium monochloroacetate) show promise for preplanting treatment, provided a sufficiently long interval is allowed before planting, and their use is considered economical. Of weeds, species of *Oxalis* and *Rumex* and volunteer oats (*Avena sativa*) were the most resistant. [See also *H.A.*, 27: 3365.]

Weed control in tobacco.

1347. CHAPPELL, W. E., AND LAPRADE, J. L.
Results of a two year study of weed control in tobacco seed beds.
Proc. 10th south. Weed Conf., 1957, pp. 76-81, bibl. 1.

Spring and autumn treatments with various compounds were applied to tobacco (2 varieties) seed beds on 2 soil types. Plant number and weights for MC-2, allyl alcohol and Vapam treatments in general indicated an increase over the controls. Calcium cyanamide gave poor results, possibly owing to lack of moisture.—*Weed Abstr.*, **6**, No. 1695.

1348. KLINGMAN, G. C.
Tobacco weed control in field grown tobacco.
Proc. 10th south. Weed Conf., 1957, pp. 82-5, bibl. 2.

Tobacco (var. Coker 140) was transplanted on May 8th and cultivated May 18th and 29th and June 16th and 23rd. A number of herbicides were applied May 29th, June 16th and 23rd, some before cultivation, some after. Observations on yield in lb./ac. and $ returns showed a reduction from treatment with TCA 4 lb./ac., 2,4,5-TES 2 lb./ac. and Crag 7355 3 lb./ac. Treatment with CDEC 1 and 2 lb./ac., CDAA 1 and 2 lb./ac., 2,4-DEB 2 lb./ac. and 2,4-DES 1 lb./ac. gave tobacco yields and $ returns as good as the cultivated control. —*Weed Abstr.*, **6**, No. 1696.

1349. MARTÍNEZ CROVETTO, R., AND ROJO, N. A.
Plantas invasoras del cultivo del tabaco en el noroeste argentino. (**Weeds infesting tobacco crops in north-west Argentina.**)
Rev. Invest. agric. B. Aires, 1957, **11**: 99-144, illus.

Descriptions are given of 62 weed species grouped in families. Species acting as hosts to insect pests are listed. Common control measures in nurseries and in the field are described and discussed.

Weed control in tropical crops.

(*See also* 1368a, p.)

1350. PELEGRIN, P.
Les mauvaises herbes dans certaines cultures fruitières tropicales. (**Weeds in certain tropical fruit crops.**)
Summ. Pap. 4th int. Congr. Crop Prot., 1957, p. 62.

The author considers weeds in bananas and pineapples from the following viewpoints: competition; soil protection; the most important weeds, their biology and dispersal; mechanical and chemical control, particularly by PCP and monuron in pineapple.—*Weed Abstr.*, **6**, No. 1812.

1351. PY, C.
Recherche d'une méthode de lutte économique contre l'*Imperata cylindrica* dans les plantations d'ananas. (**Research on an economic method of control of *Imperata cylindrica* in pineapple plantations.**)
Fruits d'Outre Mer, 1957, **12**: 377-84, bibl. 8, illus.

Among 9 herbicides tried, 5 (monuron, diuron, Boraxane, Polybor-chlorate and Shell lalang oil W) gave promising results, though none completely destroyed lalang. It is considered, however, that destruction by mechanical means, using a Rotavator, is likely to be the most economical procedure, although possibly a combination of tillage and oil sprays may prove even more satisfactory.

1352. RUBBER RESEARCH INSTITUTE OF MALAYA.
Trial of the Holt Weed Breaker.
Plant. Bull. R.R.I.M., 1957, No. 31, pp. 74-6, illus.

Two types of heavy 4-bladed roller were used in ground covers of Siam weed (*Eupatorium odoratum*), Straits rhododendron (*Melastoma polyanthum*), various grasses and *Mikania scandens*, under 6- and 7-year-old rubber trees. The rollers effectively slashed upright cover plants, but unless areas had been specially cleared for mechanical operations no economic advantage over hand slashing was obtained. The model with 3 small rollers was better adapted to the undulations of the ground than the single large roller.

1353. GUZMAN, V. L.
Post-emergence grass and weed control in sugar cane.
Proc. 10th south. Weed Conf., 1957, pp. 46-9, bibl. 3.

Ratoon cane was treated post-emergence with dalapon 3, 5 and 10 lb./ac.±2,4-D 1·5 lb./ac., TCA 15 lb./ac.+2,4-D 1·5 lb./ac. and monuron 2 lb./ac.+dalapon 5 lb./ac. or sodium 2,2,3-trichloropropionate 5 lb./ac. Best control of grass weeds (mainly *Digitaria* spp. and *Eleusine indica*) was obtained with dalapon 3–5 lb./ac., and when combined with 2,4-D it was the most effective formulation and caused no harmful effects on yields of cane or sugar.—*Weed Abstr.*, **6**, No. 1789.

1354. STAMPER, E. R.
The effect of chemical combinations as herbicides on Johnson grass control in Louisiana sugarcane.
Proc. 10th south. Weed Conf., 1957, pp. 40-5.

Plant cane was treated with TCA 4 lb./ac., 2,4,5-TP 1 lb./ac. or dalapon 2 lb./ac. as pre-emergence sprays and then again immediately after the cane was fertilized with the same or one of the other herbicides. All treatments compared well with the standard recommended practice of TCA 4 lb./ac. in terms of yield of both cane and sugar. In stubble cane dalapon 3–6 lb./ac., TCA 1–7 lb./ac. and amino triazole 1 lb./ac. and various combinations were applied when cane and grass were about 8 in. high. All treatments gave significant increases in Johnson grass control over the control, but only dalapon±TCA and TCA+amino triazole were considered satisfactory. Again all treatments gave higher yields of cane and sugar than the controls.—From *Weed Abstr.*, **6**, No. 1761. [For earlier report see *H.A.*, 27: 369.]

Weed control in turf.

1355. (LANTZ, H. L.)
Crabgrass controlled with arsonate sprays.
Ia Fm Sci., 1957, **12**(3): 4.

Two applications of disodium methyl arsonate formulations gave very good control of crabgrass in turf, and did not discolour the grass. Several applications on bent-grass seemed promising for crabgrass control on golf greens.

1356. BOCKHOLT, E. B.
Selective control of dallis grass in Bermuda grass turf.
Proc. 10th south. Weed Conf., 1957, pp. 170-2.

Disodium methyl arsonate at 10 lb./ac. in 87–174 gal. with a wetting agent gave good control of dallis grass [*Paspalum dilatatum*] in Bermuda grass. The addition of 2,4-D or ammonium nitrate may increase effectiveness.—From *Weed Abstr.*, **6**, No. 1790.

Weed control in vegetables

(*See also* 1368i, 1426.)

1357. Sweet, R. D.
Chemical weeding of vegetables.
Ext. Bull. Cornell Univ. **980**, 1957, pp. 24, illus.

The latest recommendations are given for weed control in the following crops: asparagus, beans, beets, carrots and related crops, peas, onions, spinach, lettuce, tomatoes and cucurbits. For cabbage and related crops no satisfactory selective weed killers are known.

1358. McCallum, D. W.
Weed control in horticultural crops.
Proc. 10th N.Z. Weed Control Conf., 1957, pp. 59-61.

A brief account of work in vegetable crops is given. Monuron at 1 or 2 lb./ac. has become an established practice in asparagus on a number of commercial holdings. In a pre-emergence trial monuron at 2 lb./ac. gave good results in beetroot; even 0·5 lb./ac. completely prevented the emergence of savoy cabbage; TCA at 20 lb./ac. gave adequate weed control in the 6–8 weeks from sowing to planting out. After quite extensive trials it is concluded that in carrots hand weeding can be reduced by pre-emergence sprays of CIPC at 4 lb./ac. followed by power kerosene if required for resistant weeds. Onion yields were depressed by monuron, but CIPC at 4 lb./ac. followed by sulphuric acid when necessary was effective for about 3 months. In autumn-sown onions CIPC at 4 lb./ac. was successful for the control of *Poa annua* for the entire winter at a cost of less than £6/ac. Yields of garlic were reduced by monuron at 2 lb./ac. and CIPC. For use in seed onions recommendations are: (1) monuron at 2 lb./ac. pre-emergence, (2) monuron at 1 lb./ac. applied just when flower heads are emerging but before they meet across the rows.—*Weed Abstr.*, **7**, No. 191.

1359. Foreman, M. S.
Weed control in certain horticultural crops.
Proc. 10th N.Z. Weed Control Conf., 1957, pp. 62-7, bibl. 5.

The use of 2,4-D, MCPA and monuron in asparagus and of dinoseb (amine) and MCPB in green beans is discussed. In a trial at Invermay Research Station, Otago, in which monuron, fenuron, CIPC and Oktone were applied pre-emergence to carrots, yields were depressed by all herbicides except CIPC, which, however, together with monuron caused off-flavour, coarsening of texture and discoloration of the flesh. Weed reactions to the herbicides are tabulated.—From *Weed Abstr.*, **7**, No. 192.

1360. Stryckers, J.
Het natriumzout van 2,2-dichloorpropionzuur als herbicide voor enkele gewassen. (**The sodium salt of 2,2-dichloropropionic acid as a herbicide in some crops.**) [French, English and German summaries 1 p. each.]
Reprinted from *Meded. LandbHogesch. Gent*, 1956, **21**: 595-615, bibl. 13, illus.

Dalapon has given excellent control of perennial grasses and of some rhizomatous weeds. Peas and beans sown after winter treatment with dalapon were severely affected by the herbicide, but the effects were lessened by ploughing after application. Low concentrations of dalapon were effective as pre- or post-emergence treatments with beet and chicory. Willow yield and quality was improved by dalapon application to the stubs before the buds started to swell.

1361. Ramírez, A., and Ziver, A.
Algunos resultados preliminares de control de malezas en porotos con aplicación de herbicidas en preemergencia. (**Some preliminary results of weed control in beans by application of pre-emergence herbicides.**) [English summary ⅓ p.]
Agric. téc. Chile, 1956, **16**: 30-5.

Each of the many herbicides, tested at two concentrations, was inferior to hand weeding, except for MCP at 1,014 g. per ha. which was equal to hand weeding. The only other treatments giving effective control were 2,4-D at 1,000 and CIPC at 1,920 g. per ha. The weeds did not include grasses, hence the failure of CMU.

1362. Guzman, V. L.
Pre- and post-emergence weed control in cabbage growing on organic soils.
Proc. 10th south. Weed Conf., 1957, pp. 108-11.

CDEC at 4 and 8 lb./ac. was applied to Copenhagen Market cabbage 1 day after seeding and as a post-emergence treatment at 4 lb./ac. 1 day after emergence of crop but both before weed emergence. The pre-emergence treatment caused a significant retardation of the young cabbage plants but after 6 weeks weight of plants was not significantly different from controls. Stand, number, weight and quality of marketable cabbage heads were unaffected by CDEC either pre- or post-emergence. Weed control was better in the pre-emergence test than the post-emergence at similar rates of CDEC.—*Weed Abstr.*, **6**, No. 1714. [See also *H.A.*, 28: 380.]

1363. Smith, B. A. J.
Weed control in field brassicas and onions.
N.Z. J. Agric., 1957, **95**: 607.

For brassicas TCA up to 20 lb./acre is recommended. If spurrey is dominant IPC or CIPC should be used. Oktone may be used for drilled crops. If onions are established weed free by use of sulphuric acid or oktone (at 2–4 lb./acre in 10–15 gal. diesel fuel oil), CIPC is then useful as a residual weedkiller.

1364. Picco, D.
Prove di diserbo chimico di culture di cipolla. (**Chemical weed control tests in onion crops.**) [English summary 6 lines.]
Not. Mal. Piante, 1957, No. 42, pp. 110-25, illus.
La vegetazione infestante della coltura di cipolla nelle provincie di Parma e Piacenza, e il diserbo con cloro-IPC. (**Weeds of onion crops in Parma and Piacenza provinces and their control with chloro-IPC.**) [English summary ½ p.]
Ibid.: 126-42, bibl. 4.

Good control of weeds in onion crops was achieved by spraying with chloro-IPC at 3–8 g. per sq. m. in the very early stages of crop growth. Potassium cyanate was toxic to onion seedlings when used as a pre-emergence herbicide, but gave good results with only temporary injury at 3·3 g. per sq. m. at the 2–3 leaf stage with a second spray 2 days later. Butylphenols, with or without MCPA, were useless against grass weeds. Potassium ethylxanthate, sodium TCA and petroleum distillates injured the crop. In a further series of experiments chloro-IPC applied as a pre-emergence treatment at 3 kg. per hl. of water per ha. reduced weed cover to 11% as compared with 72% in control plots, raising the onion stand from 53% to 75%.

1365. Detroux, L., de Faestraets, L., and Lavalleye, M.
Essai de désherbage chimique des cultures de pois au moyen du DNBP, du néburon et du simazin. **(Chemical weed control in peas with DNBP, neburon and simazin.)**
Parasitica, 1957, **13**: 144-54, bibl. 1, illus.

Pre-emergence applications of neburon and simazin to peas gave satisfactory weed control and were more persistent than post-emergence applications of DNBP. Neburon at 1–2 kg. per hectare resulted in good yields, but the rates of simazin used (0·5–1 kg. per ha.) were slightly phytotoxic and it is suggested that 0·25–0·4 kg. might be more satisfactory. A spinach crop grown after the peas was not affected by neburon or DNBP.—Stat. Phytopharm., Gembloux, and Inst. nat. Amél. Conserv. Leg., Wesembeek-Ophem.

1366. Thompson, F. B.
Weed control in peas.
Proc. 10th N.Z. Weed Control Conf., 1957, pp. 68-74.

MCPB (sodium) at 1·5 lb./a. reduced yields of several named varieties of peas by 20% under weed-free conditions, and increased yields by from 20–100% under weedy conditions compared with unweeded controls. *Amaranthus retroflexus* and *Coronopus didymus* were controlled but not *Polygonum persicaria*. Results from spraying Victory Freezer peas at the 3-, 6- and 8-node stages showed that under weedy conditions the earlier the spraying the higher the yield. At rates up to 2 lb. MCPB (sodium) had no adverse effect on palatability. 2,4-DB (sodium) gave better weed control but was more toxic to peas. Dinoseb (ammonium) gave better weed control and better yields than MCPB.—*Weed Abstr.*, **7**, No. 195.

1367. Robbins, W. A., and Taylor, W. S.
Injury to canning tomatoes caused by 2,4-D.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 373-8, bibl. 10.

In an attempt to estimate herbicide drift damage the alkanolamine salt of 2,4-D was applied as a whole plant spray to field-grown canning tomatoes at concentrations similar to those observed in fields affected by volatile drift from areas treated for weed control. Concentrations of 5 or 75 p.p.m. generally resulted in reduced yield and delayed maturity, the effects being most pronounced with the higher concentration applied at first bloom. Yield losses ranged from 14 to 80%. Both concentrations applied at first bloom reduced fruit size and increased acidity, but the higher concentration applied at full bloom increased fruit size and decreased acidity. Fruit colour was not materially affected.—Campbell Soup Co., West Chicago, Ill.

Noted.

1368.

a Anon.
Simazin.
Sugar News, 1957, **33**: 482-5.
A note on the use of 2-chloro-4, 6-bis-ethylamino-s-triazine as a herbicide.

b Arle, H. F., and others.
Aquatic weeds; submerged and emergent.
Res. Progr. Rep. west. Weed Control Conf., 1956, pp. 80-6.
A summary of 7 reports—see *Weed Abstr.*, **6**, No. 1739.

c Bradbury, H. E., and Aldrich, R. J.
Survey reveals extent of horse nettle infestation.
N.J. Agric., 1957, **39**(4): 4-7, illus.
Solanum carolinense in orchards, etc., controlled by ATA followed by discing.

d Carling, K. E., and Jackson, A. A.
Keeping blanket weed off irrigation tanks.
Grower, 1958, **49**: 296-7, illus.
By adding chlorine to the water, which is filtered through straw before use.

e Holloway, J. K., and Huffaker, C. B.
Establishment of the seed weevil, *Apion ulicis* Forst., for suppression of gorse in California.
J. econ. Ent., 1957, **50**: 498-9, bibl. 9.
The weevil, released in 1953, appeared well established in 1956, but its effectiveness has yet to be evaluated.

f Huffaker, C. B.
Fundamentals of biological control of weeds.
Hilgardia, 1957, **27**: 101-57, bibl. 177, illus.
A critical review of all aspects of the subject.

g Hull, H. M., and others.
Chemical and physiological studies.
Res. Progr. Rep. west. Weed Control Conf., 1956, pp. 87-98.
A summary of 13 reports on herbicides—see *Weed Abstr.*, **6**, No. 1886.

h Kott, S. A.
Achievements of agrobiological science in weed control. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1957, **22**(10): 22-5.
A review, including suggested cultural methods of control of different types of weed.

i Kühnel, W.
Wuchsstoffschäden an Rosenkohl. **(Hormone damage to brussels sprouts.)**
NachrBl. dtsch. PflSchDienst, Berlin, 1957, **11**: 224-5, bibl. 1, illus.
Symptoms induced by 2 growth-substance herbicides are described.

j LEMAISTRE, J.
Notes bibliographiques sur la destruction des mauvaises herbes dans les plantations d'agrumes. (**Bibliographical notes on the destruction of weeds in citrus plantations.**)
Fruits d'Outre Mer, 1957, **12**: 353-5, bibl. 21.
Surveys literature on use of monuron and diuron, oils, 2,4-D, and dalapon.

k MICHIELS, A., AND DUSTIN, A.
Quelques acquisitions dans le domaine du controle de la végétation aquatique. (**Some achievement in aquatic weed control.**)
Meded. LandbHoogesch. Gent, 1956, **21**(3): 627-41, bibl. 9.
See *Weed Abstr.*, **6**, No. 1983.

l PETERSEN, H. I.
Årsoversigt for Statens Ukrudtsforsøg 1956. (**Annual Report of the Danish Institute for Weed Research 1956.**) [English summary 2½ p.]
Tidsskr. Planteavl, 1957, **61**: 620-37.

m ROBERTS, H. A.
Herbicides in horticulture.
Agric. Rev. Lond., 1958, **3**(9): 34-7.
In vegetable, fruit and ornamental crops in Britain.

n SMITH, F. D.
Ivy: good servant, dangerous master.
Gdnrs' Chron., 1957, **142**: 450, illus.
Winter applications of 2,4,5-T in oil recommended for destruction of ivy.

o SMITH, G. N., GETZENDANER, M. E., AND KUTSCHINSKI, A. H.
Determination of 2,2-dichloropropionic acid (dalapon) in sugar cane.
J. Agric. Food Chem., 1957, **5**: 675-8, bibl. 5.

p THISTLE, A.
The biological control of noxious plant species in Hawaii.
World Crops, 1957, **9**: 447-9, 446, illus.

VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE.

General.

(*See also* 1031, 1065, 1073, 1319, 1320, 1357-1367, 1546e, 1675, 1683, 1998p, 2012, 2017, 2028, 2033, 2035, 2040, 2045.)

1369. DAUPLE, P.
Production maraîchère. (**Vegetable production [in Morocco].**)
Terre maroc., 1957, **31**: 309-14, 335-9, illus.

The author sketches the considerable and steady rise in vegetable production and in vegetable exports from Morocco since 1933 broken only by the war years 1942–1945. He then considers in detail the production, particularly for the overseas market, of early varieties of beans, capsicums and marrows and main season tomatoes, onions and watermelons. Export figures are given for fresh and canned vegetables.

1370. KEMP, H. T., FULLER, R. G., AND DAVIDSON, R. S.
Inhibition of plant growth by root-drench applications of kinetin.
Science, 1957, **126**: 1182, bibl. 6.

Tomato seedlings grown in sand in pots were watered with 10, 50 or 100 p.p.m. solutions of kinetin 3 times a week for 4 weeks. All concentrations inhibited growth, the effect increasing with dosage. Plants treated with 100 p.p.m. kinetin had small, atypically shaped leaves, drastically reduced root systems and purple pigmentation similar to that associated with P deficiency. They often showed loss of turgor on warm days. The plants flowered 2 weeks later than the controls and produced smaller flowers and fruits. Similar treatment of tomato plants grown in soil caused comparatively slight growth inhibition. Elongation of bean plants and of some field crop plants grown in sand was also inhibited by root drenches of kinetin. Experiments now in progress indicate that a single watering with 100 p.p.m. kinetin significantly inhibits growth of plants in sand, but that spraying seedlings to the point of run-off produces no observable effect.—Battelle Memorial Inst., Columbus, Ohio.

1371. LEMAN, W. M.
Die Verwendung von Leuchtstoffröhren als Wanderlicht. (**The use of fluorescent lamps for mobile illumination.**)
Gartenwelt, 1957, **57**: 360-1, illus.

A frame bearing several fluorescent strip lights has been erected to move rapidly to and fro across plant rows. In the examples given the frame covered 4 rows and travelled over 8 or 12 rows at a rate of 9 m. or 16 m./min. respectively. Light intensity above the outer rows was low, and dry weight values were below those of control plants which received static lighting. Marked increases in dry weight (up to 70%) compared with the controls were obtained by the extra illumination in the middle rows. Other effects of mobile illumination were earlier initiation of generative organs in tomatoes and cucumber, heavier radish roots and bigger lettuces.—Lenin Acad. agric. Sci., Moscow.

1372. NICOLAISEN, W., AND BUNTROCK, H.
Der Einfluss künstlicher Bestrahlung auf die Erwärmung der Pflanze. (**The effect of artificial radiation on the temperature of plants.**)
Gartenbauwiss., 1957, **22**: 246-71, bibl. 21, illus.

Young plants of cucumber, kohlrabi and tomato were illuminated with various types of lamp, both in a dark room and in a glasshouse. Plant temperature varied with the type of lamp, and was also affected by the humidity and movement of the surrounding air. The greatest increase in temperature of plant surface was obtained with infra-red lamps, while incandescent lamps had the least effect on plant temperature. Wide differences between plant surface and internal tissue temperatures were observed.—Inst. Gemüseb., Tech. Hochsch., Hannover.]

1373. Muraš, I. G., and Goršunova, E. A.
Producing high vegetables yields on artificial nutrient media. [Russian.]
Sad i Ogorod, 1957, No. 11, pp. 12-15, illus.

Cucumber and tomato culture on nutrient media was studied and the techniques employed are outlined. The media were gravel, gravel-sand, water and a soil mixture, and the basic nutrient solution also contained B, Mn, Cu and Zn. The highest cucumber yields (26 to 39 kg. per sq. m. depending on variety) were obtained on gravel and gravel-sand; some varieties were found quite unsuitable for soilless cultivation. The highest tomato yield (15·3 kg. per sq. m.) was produced by the variety Altai in water culture.

1374. Inden, T., Ogawa, Y., and Arai, K.
On the physiology of roots in vegetable crops. (V) Influence of aeration on the growth and absorption of nutrients by vegetable crops in solution culture. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1957, **26**: 171-7, bibl. 16, illus.

Vegetables were grown in a nutrient solution with 3 levels of oxygen aeration. In autumn and winter crops the effect of aeration was most noticeable in radishes, cabbages and peas, and least in broad beans, strawberries and onions. Before April growth of onions and broad beans was greatest in aerated solutions, while during and after April growth was improved by aeration. With summer crops aeration increased growth of tomatoes and cucumbers, but had little or no effect on eggplants, peppers and asparagus beans. Absorption of ammonium-N, P and K was reduced at low oxygen levels, but nitrate-N absorption was much less affected. [For part IV see *H.A.*, 17: 536.]

1375. Penningsfeld, F., and Forchthammer, L.
Reaktion der wichtigsten Gemüsearten auf gestaffelte Düngungshöhe. **(The reaction of important vegetable crops to increased levels of manuring.)**
Gartenbauwiss., 1957, **22**: 208-35, bibl. 7, illus.

A soil mixture low in nutrients was used in pot studies on the effect of increasing applications of a complete fertilizer to beans, endive, cucumbers, lettuce, radish, black radish, beetroot, red cabbage, celeriac and tomato. The reaction of the vegetables to the fertilizer levels (1–7 g. per litre) was very variable; lettuce, endive and radish showed symptoms of excess at the top rates of applications, at which red cabbage, beetroot and celeriac produced their highest yields. Changes in leaf : root and leaf : fruit ratios, as a result of improved nutrient conditions favoured leaf development. Market quality was highest at the manurial level producing the highest yields, and at such levels flavour of the 2 radish types was best. In general flavour was best at a lower level than the optimum for yield, at which plants contained more water and less sugar. Chlorophyll contents increased with fertilizer applications. The dry weight contents of major nutrients increased with fertilizer levels, except for Ca and Mg contents. Iron and B contents decreased with increasing fertilizer levels. The water uptake per kg. of dry weight production decreased as fertilizer levels increased.—Inst. Bodenk. u. PflErnähr., Weihenstephan.

1376. Scharrer, K., and Werner, W.
Über die Abhängigkeit des Ascorbinsäure-Gehaltes der Pflanze von ihrer Ernährung. **(The effect of nutrition upon the ascorbic acid content of plants.)**
Z. PflErnähr. Düng., 1957, 77: 97-110, bibl. 19.

Two years' experiments with many kinds of vegetables grown in sand culture led to the following conclusions on the relationship between nutrition and vitamin C content: (1) Nitrogen had an unfavourable effect on per cent. vitamin C content, while total vitamin C yields were greatly improved. Nitrate N was clearly more favourable to vitamin C production than ammonium N. (2) Phosphoric acid did not affect vitamin C content; P may therefore be presumed to have no function in the synthesis of ascorbic acid. (3) Potassium was found to have a pronounced positive effect on vitamin C production. (4) Minor elements, especially manganese, also increased vitamin C content and yield if applied within physiological limits, but dosages exceeding the optimum had a detrimental influence on ascorbic acid synthesis. A physiological interpretation of the results is attempted.—Justus Liebig-Hochschule, Giessen.

1377. Geissler, T.
Untersuchungen über die Wirkung von Superphosphatgranulaten verschiedener Grösse und Zusammensetzung bei Gemüsepflanzen. **(Studies on the effect of various sizes and composition of superphosphate granules on vegetables.)**
Gartenbauwiss., 1957, **22**: 322-51, bibl. 12, illus.

The effect of several forms of superphosphate granules on growth and yields of spinach and tomato were observed in pot tests, using 2 soil types. When spinach was followed by tomato plants the best effect was obtained with grains of 3–5 mm. diameter. A granular mixture of peat and superphosphate (1 : 2) had the more favourable effect on spinach, while the pure mineral form was better for the tomatoes. Spinach growth was best with fertilizer placement at 3 cm. in comparison with deeper placement or surface mixing. In tests with different organic additions to form superphosphate granules, the best effect on spinach yields was obtained with the addition of soil compost, the optimum ratio being 2 parts compost:1 part superphosphate. Spinach yields were reduced by the addition of lime to superphosphate forms, the effect being more marked with the pure mineral granules than with organic-mineral mixtures.—Inst. Gartenb., Grossbeeren.

1378. Geraldson, C. M.
Factors affecting calcium nutrition of celery, tomato, and pepper.
Proc. Soil Sci. Soc. Amer., 1957, **21**: 621-5, bibl. 22, illus.

Blackheart of celery and blossom-end rot of tomato and capsicum were caused or enhanced by two sets of factors affecting Ca nutrition: (1) excess of soluble ammonium, K, Mg or Na salts, or deficiency of soluble Ca; (2)

excess total salts, even with satisfactory Ca ratios. Defficient B scarcely affected Ca nutrition, but high Ca ratios severely accentuated B deficiency. Spraying is recommended as a means of applying supplementary Ca. [See also *H.A.*, 27: 546.]

1379. Uspenskaja, E. V.
Efficacy of green manures in vegetable growing. [Russian.]
Soc. s. h. Uzbekistana, 1956, No. 3, pp. 70-2, from *Ref. Ž.* (*Biol.*), 1957, No. 13, Abstr. 55,662.

In experiments at the Uzbekistan vegetable-potato experiment station the use of the overwintering pea variety Nicolson as green mature increased vegetable yields, and this increase was enhanced further by applying 4·5 centners/ha. of P fertilizer [superphosphate] when the green manure was ploughed in. The best results, however, were obtained when NPK was applied with the green manure, increasing the yield of tomatoes by 90%, of late cabbage by 180% and of melon by 80%.

1380. Riethus, H., Gerdung, R., and Grunewald, J.
Einfluss der Wassersättigung des Bodens auf den Ertrag einiger Gemüsearten. **(The effect of degree of soil saturation by water on some vegetables.)**
Gartenbauwiss., 1957, **22**: 236-45, bibl. 5.

Crops of carrots, tomatoes, celeriac, leeks, kohlrabi, dwarf beans and spinach were grown at various levels of soil moisture supplied by sub-irrigation. The highest yields with most crops were obtained with moisture levels maintained at 50 to 75% saturation, but no differences in yield were observed with kohlrabi. Tomato fruit quality was improved and yields were earlier when the plants were grown at levels of 65–75% saturation. No definite differences in vegetative growth were observed.—Inst. Gemüseb., Tech. Univ. Berlin.

1381. Georgieva, Ja. M.
Possibilities of growing vegetables without irrigation in Dobrudža. [Bulgarian.]
Hidrol. i Meteorologija, 1956, No. 3, pp. 57-62, from *Ref. Ž.* (*Biol.*), 1957, No. 15, Abstr. 64,897.

In Bulgaria the highest average non-irrigated tomato yield in 1953–1955 was produced by the variety Vitoša 525, centners/ha. [*ca.* 10 tons per acre], while Hybrid 10 ×Bison yielded 488 ct./ha. In trials on planting tomatoes at various distances from a shelter belt these varieties did best when planted south of the belt at a distance of 20 m. Peas without irrigation yielded 8 ct./ha., though the seed had a slightly coarser texture than that from irrigated soil. The possibility of growing onions, garlic and carrots without irrigation was also established.

1382. Szymusik-Kumelowska, I.
Wpływ naświetlania nasion sałaty, rzodkiewki i pomidorów promieniami Rtg na zawartość witaminy C. **(The effect of X-ray irradiation of lettuce, radish and tomato seeds on the vitamin C content.)**
Roczn. Nauk rol., Ser. A, 1957, **74**: 647-51, bibl. 3 illus.

Seeds of May Queen lettuce, Saxa radish and Kondine Red tomato were exposed to X-rays ranging from 500 to 3,000 r., and those of Icicle radish from 1,000 to 5,500 r. In general, X-ray treatment had little effect on the vitamin C content of lettuce leaves or radish roots, but increased that of tomato fruits especially from the second picking.

1383. Lityński, M.
Wpływ wilgotności środowiska na żywotność nasion niektórych gatunków roślin warzywnych. **(The influence of moisture in the environment on the vitality of certain species of vegetable seeds.)** [English and Russian summaries 2 pp. each.]
Roczn. Nauk rol., Ser. A, 1957, **76**: 217-94, bibl. 24.

In this work at the Wrocław Agricultural College on 10 species of vegetables the period of tests was 2 years and the seeds were kept in hygrostats at humidities ranging from 40 to 90%. On the whole the seeds reacted favourably to low, i.e. 40–60%, humidities, but those of bean, tomato and pea withstood humidities up to 75% without adverse effect. Seeds stored under favourable conditions during the first year germinated better than those stored under unfavourable conditions. Tables are given showing the optimum and permissible humidity limits ensuring standard rates of germination and the relationship between initial water content, water loss and energy and percentage of germination after storage in varying humidities. There was resurgence of vitality in the first, and sometimes second spring in almost all species, probably connected with the end of the dormant period.

1384. Bremer, H.
Chemische Saatgutbehandlung bei Gemüse. **(Chemical seed treatment for vegetables.)** [English summary 1¼ pp.]
Gartenbauwiss., 1957, **22**: 364-96, bibl. 85, illus.

The emergence of cabbages, peas, beans, carrots, tomatoes, lettuces and onions was improved in most cases after seed treatment with captan, COBH (chinonoxin-benzoylhydrazon) or thiram. Treated seed of beans, carrots and lettuces was stored for 6 to 8½ months without affecting viability. With spinach captan and COBH improved emergence, whereas captan and thiram were most effective for cucumber seeds. Emergence of celeriac seed was not improved by chemical treatment. Leek seed emergence was reduced after coating with chloronitrobenzene, thiram or polyram preparations. The adherence of the preparations to the various vegetable seeds showed wide variation.—Inst. Gemüseb., Neuss, Lauvenburg.

1385. Blanco, L. C.
Comparative effects of Arasan, Granosan and Semesan dust treatments on vegetable seeds as a control for damping-off.
Araneta J. Agric., 1957, 4(2): 57-64, bibl. 11.

In an experiment to control damping-off (*Pythium debaryanum*) of cabbage, lettuce, radish, cauliflower, pechay (*Brassica pekinensis*) and mustard Arasan (tetramethylthiuram disulphide) was an effective seed protectant for all except cabbage, Semesan (hydroxymeric chlorophenol) for all except lettuce, and

Granosan (ethyl mercury phosphate) was effective only for lettuce and mustard seeds.—Araneta Inst. Agric. Philippines.

1386. Apltauer, J., and Kozová, J.
Vliv bakterisace azotobakterem na výnosy některých zemědělských plodin a zeleniny. **(The effect of azotobacter inoculation on yield of vegetables and some other crops.)** [Russian, English and German summaries ¼ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1957, **30**: 1111-20, bibl. 60.

Seeds of cabbage, kohl rabi, carrot and tomato were inoculated with azotobacter. Yield increases were observed with cabbage and carrots, and were statistically significant with tomatoes.

1387. Picco, D.
Prove preliminari di attività anticrittogamica del trifenilacetato di stagno. **(Preliminary tests of fungicidal action of stannic triphenylacetate.)** [English summary 5 lines.]
Not. Mal. Piante, 1957, No. 42, pp. 33-42, illus.

Tomato plants sprayed with 0·4% stannic triphenylacetate sustained severe damage to leaves and young stems. Young flower trusses were almost completely destroyed, but fruits were only slightly damaged. Celery given the same treatment showed slight toxicity symptoms, but made excellent growth and was freer from leaf spot (*Septoria apii*) than where treated with 1% bordeaux mixture.

1388. Matolcsy, G., and Sáringer, G.
Új inszekticidek korai zöldségfélék atka- és levéltetű-kártevői ellen. **(New insecticides for aphid and mite control in forced and early vegetables.)** [Russian and English summaries 1 and 1½ pp. respectively.]
Növenytérméles, 1957, **6**: 165-74, bibl. 15.

Several insecticides were tested for control of mites and aphids, the most effective being dimethyl-2,2-dichlorovinyl phosphate. 0,0-dimethyl-1-hydroxy-2,2,2-trichloroethyl-phosphonate was only slightly less effective and was less toxic to man. In a series of tests with frame-grown capsicums 0·1% of this insecticide gave 80–98% mortality of aphids and mites, but owing to its lack of ovicidal action repeated treatments were necessary. Results in the field were less satisfactory. As a fumigant none of the insecticides was effective against aphids and mites. A combination of 1 part 87% lindane to 3 parts of 0,0-dimethyl-1-hydroxy-2,2,2-trichloro-ethyl-phosphonate applied at 0·4 g. per cu. m. gave about 80% mortality of mites and complete control of aphids.

1389. Laurente, V. R., and Iral, P. T.
Evaluation of Pestox III as an insecticide for different species of aphids.
Araneta J. Agric., 1957, **4**(2): 65-80, bibl. 10.

The systemic insecticide Pestox III, 0·06% and 0·10%, applied to eggplant, broad bean and pechay (*Brassica pekinensis*), controlled *Aphis laburni*, *A. gossypii* and *A.* sp.

1390. Kubik, B. M.
Outmoding the picking crew.
Amer. Veg. Gr, 1957, **5**(10): 12-13, 27-9, illus.

Recent advances in the development and testing of mechanical harvesters, many of them prototypes, for snap, pole and lima beans, tomatoes, radishes, asparagus, beetroot and carrots, and of field conveyors for lettuce and tomatoes are described. J.R.L.

1391. Czu, D., Hun, K., and Shen, C.
Changes in the ascorbic acid and carotene contents of vegetables during storage. [Chinese, with English summary.]
Acta nutrimenta sinica, 1956, **1**(3): 249-56, bibl. 8, from *Ref. Ž.* (*Biol.*), 1957, No. 15, Abstr. 64,531.

The smallest reduction in ascorbic acid and carotene contents occurred at 0–2° C. and the greatest at 16–26° C. Losses of ascorbic acid during storage were greater in spinach than in cabbage and tomatoes. In the last 2 at 0–2° C. no losses in ascorbic acid content were noted over 14 days.

Artichokes.

1392. Prota, R.
La *Depressaria* dei capolini. **(The globe artichoke moth, *Depressaria erinaceella*.)**
Inf. fitopat., 1957, **7**: 316-18, illus.

Preliminary control experiments showed promising results from treatments in October and November with mixtures of a chlorinated compound (aldrin, dieldrin or endrin) and an organic phosphorus product such as parathion. It was also necessary to destroy infested heads by mid April to prevent the larvae of *Depressaria erinaceella* from escaping into the soil to pupate.

Asparagus.

1393. Braak, J. P., and Zeilinga, A. E.
Production of a colchicine-induced tetraploid asparagus. [Dutch summary ½ p.]
Euphytica, 1957, **6**: 201-12, bibl. 11, illus.

Colchicine treatment of germinating asparagus seeds under vacuum has given excellent results. Treatment after 5 days' germination at 30° C. gave the best results; at this stage a 1·6% solution could be used, which produced 60% tetraploids.—Inst. hort. Plant Breeding, Wageningen.

1394. Eckert, J. E.
Honeybees increase asparagus seed.
Amer. Bee J., 1956, **96**: 153-4, from abstr. in *Bee World*, 1957, **38**: 300.

A female asparagus plant caged with 2 male plants produced only 6·2 g. seed, while an adjacent female plant pollinated by bees produced 775·3 g. It is suggested that 1–2 colonies of bees per acre will ensure adequate pollination for asparagus seed production.—Univ. Calif., Davis.

1395. Kepner, R. A.
Improved asparagus harvester.
Calif. Agric., 1957, **11**(12): 4-6, 13-14, 20, illus.

An asparagus harvester, based on the principles of an earlier model [see *H.A.*, 23: 707 and 25: 529] but with a 35 in. effective width, was commercially tested on peat and clay loam soils in 1957. The harvester recovered 94% of all spears longer than 3½ in. The percentage of culls other than seedy or open heads was a little greater for machine harvesting than for hand cutting. The harvester proved an effective means of controlling weeds on top of the beds, thus eliminating the need for discing. Of 3 cutting intervals tested, the longest was the best (i.e. cutting when 2–6% of all spears over 3½ in. in length were taller than 12 in.). The machine-harvested yield was estimated at 55% of the hand-cut yield. The machine with 1 operator replaced 15 hand-cutters and 2 carters.—Univ. Calif., Davis.

1396. Brody, H. D., and Francis, F. J.
The effect of some growth inhibitors as post-harvest treatments for asparagus.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 281-5, bibl. 13.

Five growth inhibitors were tested for their effect on respiration rate, resistance-to-cut, elongation and weight gain in fresh, cut asparagus. The inhibitors were as follows: maleic hydrazide (MH), benzothiazol-2-oxyacetic acid (Regulant 3201), 2,4-dichlorobenzyl-nicotinium chloride (DBNC), (4-hydroxy-5-isopropyl-2-methyl-phenyl) trimethyl ammonium chloride (Amo-1618), and hexyldimethylpiperonylammonium chloride (HDPAC). Maleic hydrazide, regulant 3201, and DBNC lowered the values for resistance-to-cut for asparagus stalks, but the effect was very small. There appeared to be an inverse relationship between the respiration rate and the values for resistance-to-cut for every inhibitor except maleic hydrazide. In terms of elongation and weight gain Amo-1618 and HDPAC were definitely inhibitory, whereas regulant 3201 was markedly stimulatory. None of the treatments appeared to offer promise as a method for extending the shelf-life of fresh asparagus. [Authors' summary and conclusions.]—Univ. Mass., Amherst.

Brassicas.

(*See also* 1030, 1379, 1474, 1545k, n, 1546m, s, t.)

1397. Wood, P. D.
Brassicas.
A.R. Rosewarne exp. Hort. Stat. 1956, 1957, pp. 14-17.

Broccoli: The use of large seedlings for planting out resulted in better survival and slightly larger curds than that of small seedlings. Curd size was also slightly increased by top dressing in late summer with 3 cwt. sulphate of ammonia per acre, and slightly decreased by banking up. Sowing date had little effect on yield, but late planting of early broccoli reduced it. Close spacing, 2 ft. × 2 ft., markedly increased yield in crates per acre but decreased curd size compared with various wider spacings. Boron did not reduce the amount of central stem rotting. *Spring cabbage:* Source of N (sulphate of ammonia, nitrate of soda, nitrate of potash or urea) had little effect on yield, but split application with the equivalent of 10 cwt. per acre nitrate of soda in early January and 10 cwt. in late February gave higher yields than split application with half this rate or than a single application of 5 or 10 cwt. per acre in early January.

1398. Apeland, J., and Bremer, A. H.
Vinterkvitkål sør og nord i landet. **(Cabbage growing in northern Norway.)**
Norsk Hagetid., 1957, **73**: 162-4, illus.

Raising white cabbage plants in pots shortened the growing season as compared with other methods of plant raising. The northern boundary of the crop was thus extended from 67° 16′ N to 68° 55′ N, the difference in mean summer temperature between the two locations being 1° C.

1399. Ito, H., and Kato, T.
Studies on the head formation of Chinese cabbage. Histological and physiological studies on head formation. [Japanese, with English summary 1 p.]
J. hort. Ass. Japan, 1957, **26**: 154-62, bibl. 9, illus.

Leaves of Chinese cabbage were observed to curve in on being brought into the dark; this appears to be a hyponastic response to dark. In experiments with NAA it was shown that the leaf blade was more sensitive to NAA application than the petiole, and that the tip was the most sensitive part of the blade. Leaves with high carbohydrate contents showed a stronger hyponastic response than leaves high in N. The naturally-occurring auxin in leaves was IAA; leaf-blade contents of IAA were higher than petiole contents. The highest auxin contents were found in the outer green leaves of the head. Both carbohydrate and N contents increased from the outer to the inner leaves. It is concluded that auxin activity in the leaves is the most essential internal factor responsible for heading, and that nitrogenous compounds and carbohydrate levels are also important. Head formation began in leaves high in auxin and with a high C/N ratio.

1400. Sítař, J.
Vegetativní rozmnožování košt'álových zelenin. **(Vegetative propagation of brassicas.)** [Russian, English and German summaries ¾ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1957, **30**: 1141-60, bibl. 25, illus.

Rooting of stem cuttings with an attached leaf was good with head and savoy cabbage, brussels sprouts, kohl-rabi and cauliflower. Bud regeneration by leaf cuttings was best with cauliflower, good with kohl-rabi and poor with head cabbage. Axillary buds grew best in sprouts and cabbage, but poorly with cauliflower. Root buds were regenerated in decapitated plants best in cauliflower, but hardly at all in head cabbage. With leaf cuttings the lamina should be cut away without damaging the main vein or the tip of the leaf. Clean quartz sand was the most suitable medium for propagation, and the optimal temperature range was shown to be 16 to 20° C. Adventitious and axillary buds, taken during the first year of growth, continued to grow vegetatively during their first year of growth. Some axillary buds from older plants grew vegetatively and some flowered. Kohl-rabi, cabbage and sprout plants produced from buds were similar to those grown from seed. Cauliflower grown from adventitious buds developed irregular and undersized heads.

1401. CANDELA, M. I., FISHER, E. G., AND HEWITT, E. J.
Molybdenum as a plant nutrient. X. Some factors affecting the activity of nitrate reductase in cauliflower plants grown with different nitrogen sources and molybdenum levels in sand culture.
Plant Physiol., 1957, **32**: 280-8, bibl. 24.

Cauliflower plants cv. Majestic were grown in sand culture with deficiency, normal or excess levels of Mo and with N supplied as nitrate, nitrite or ammonium sulphate. The net nitrate reductase activity was maximal in mature leaves and was markedly lower in both senescent and rapidly expanding young leaves. Extracts from leaves possessed greater net total activity than those from stems or petioles, and that of roots was extremely low. The specific activity per mg. protein was much greater in petioles than in leaves or stems. The N source also determined the level of nitrate reductase activity. This was high in plants given nitrate and usually high in those given nitrite. Plants given ammonium sulphate possessed markedly lower but not negligible activities. In regions showing maximal activity plants grown without Mo possessed much lower net total and specific nitrate reductase activities than the normal plants. In regions showing minimal activity these differences were small. Plants given excess Mo did not appear to possess more activity than normal plants. The effect of Mo supply mentioned above was greatest with plants given nitrate and least with those given ammonium sulphate. Infiltration of Mo into leaves of deficient plants resulted in increases in nitrate reductase activity in 18 to 24 hours. Nitrate reductase activity was greatly depressed by prolonged darkness during 2–6 days and recovered rapidly within a few hours of restoring the plants to light. Exclusion of air for 48 hours also caused marked decreases in activity; and readmission of air led to rapid recovery in activity. Changes in activity were not closely related to the total soluble protein content of the tissues. The distribution of the enzyme in plants grown with different Mo levels and N sources was markedly different from the distribution of extractable protein which was, however, similar to that of another enzyme, acid phosphatase. [From authors' summary.]—Long Ashton Res. Stat., Univ. Bristol. [For part IX see *H.A.*, 27: 3578.]

1402. RYŽKOVA, A. S.
The relationship between the resistance of plants to diseases and nutrition and biochemical composition. [Russian.]
Agrobiologija, 1957, No. 3, pp. 129-31, bibl. 4.

Cabbage plants grown in Knop solution of different concentrations with different levels of N, P and K and 3 different forms of N were inoculated with *Xanthomonas campestris*. A positive correlation was found between sugar content and disease resistance, and between high N content from ammonium- and ammonium-nitrate-N and disease susceptibility. No relationship was shown between other values such as pH and peroxidase activity and disease resistance.

1403. HEROLD, F.
Zur Symptomatik und Schadwirkung des Kohlschwarzringfleckenvirus. **(On the symptoms and losses caused by the cabbage black ring spot virus.)** [English summary 5 lines.]
Phytopath. Z., 1957, **31**: 149-57, bibl. 13, illus.

The black ring spot virus produces different symptoms —which are described—in different kinds of cabbage. The losses caused by the disease range from about 20 to 45%. The virus strain studied is defined by the response induced in various test plants. A disease observed on horse-radish seems to be caused by the same virus. [From author's summary.]—Inst. Gemüseb. Unkrautforsch., Neuss II Land.

1404. PELLETIER, R. L., AND SIMARD, J.
Effets de certains produits chimiques sur la résistance du chou à la jaunisse (*Fusarium f. conglutinans*) (WR.) Snyder and Hansen. **(The effect of certain chemicals on the resistance of cabbage to yellows (*Fusarium* f. *conglutinans*).**
Rep. Que. Soc. Prot. Plants, 1956, 1957, **38**: 40-4, bibl. 13.

Resistance to cabbage yellows is of two types. Plants of var. Marion Market (possessing type A resistance), when treated with p-nitrophenol, showed less damage from yellows than those treated with copper 8-quinolinolate or 2,4-D and than the controls. Plants of var. Wisconsin Hollander (possessing type B resistance) and var. Copenhagen Market (generally susceptible), when treated with NP, showed increased yellows damage compared with those treated with Cu-8-Q or 2,4-D or with the controls. [For earlier work see *H.A.*, 27: 426.]

1405. ANDRÉN, F.
Bekämpningsförsök mot klumprotsjuka. **(Control of club root.)**
Växtskyddsnotiser, 1957, **21**: 34-5, illus.

Normal plant development of brussels sprouts was observed in plots of club-root infected soil when given a pre-planting treatment of 25 kg. Brassisan broadcast per 400 sq. m. soil. Growth on untreated plots was reduced.

1406. RICH, S.
Griseofulvin, lithium salts, and zinc glass frit for control of cabbage club root.
Plant Dis. Reptr, 1957, **41**: 1033-5, bibl. 8.

Griseofulvin was effective in controlling club root when applied as a soil treatment [at 20 and 40 mg./kg. dry soil]. Zinc glass frit reduced the amount of disease, but lithium salts were ineffective when applied as soil treatments. There was no correlation between severity of clubbing and height of plant. No downward translocation was detected when griseofulvin was applied to foliage. Therefore, this compound must be applied as a soil treatment to be effective as a control measure. [Author's summary.]—Conn. agric. Exp. Stat., New Haven.

1407. Darpoux, H., Louvet, J., and Ponchet, J.
Essais de traitement des semences de crucifères contre le *Phoma lingam* (Tode) Desm. et l'*Alternaria brassicae* (Berk.) Sacc. **(Tests on seed treatment of crucifers against *Phoma lingam* and *Alternaria brassicae*.)**
Ann. Épiphyt., 1957, **8**: 545-57, bibl. 7, illus.

The best results from seed treatment were obtained with organomercuric fungicides at 300 g./quintal [50 kg.] seeds. Two compounds (ethyl mercury phosphate and methyl mercury dicyandiamide) were phytotoxic if used at more than 200 g./quintal or if treated seeds were stored for some months. Disinfection with thiram, captan, quinone compounds and quinol derivatives at 300 g. was satisfactory.—Stat. cent. Path. végét., Versailles.

1408. Wene, G. P.
Cabbage aphid control.
J. econ. Ent., 1957, **50**: 576-7, bibl. 2.

Phosdrin, malathion and demeton gave excellent cabbage aphid (*Brevicoryne brassicae*) control on cabbage and brussels sprouts when applied twice at 9-day intervals. Promising results were also obtained with Diazinon, endrin, Dow ET-57 and C.&C.7744 (Sevin).—Tex. agric Exp. Stat., Weslaco.

1409. (Moreton, B. D., and Light, W. I. St. G.)
Control of cabbage root fly by root dips.
Exp. Hort., 1957, No. 1, pp. 53-4, bibl. 3.

In continuation of earlier work [see *H.A.*, 23: 1862, 24: 438, 26: 1713], dipping the roots of summer cabbage in 0·1% dieldrin (miscible) or 1·5% dieldrin dust gave a significantly high degree of control of root damage, but 0·01% dieldrin drench just after planting and a calomel dip gave only moderate control. The dieldrin dip again caused no material check to growth.—N.A.A.S., South Eastern Region.

1410. Žuravskij, G. I.
Formation of wound cork on plants injured by insects. [Russian.]
Sb. Rabot In-ta prikl. Zool. i Fitopatol., 1956, No. 4, pp. 243-8, from *Ref. Ž.* (*Biol.*), 1957, No. 15, Abstr. 64,483.

On a cabbage leaf injured by caterpillars of cabbage white butterfly (*Pieris brassicae*) a thin suberic layer was formed on the surface of the wound 18 hours after wounding as a result of oxidation of fatty substances. After 2–3 days tissue was formed, the cells of which ceased to divide after 5 days. Five days after wounding suberisation began in the 2 upper rows of cells. Suberisation of all cells of the injured tissue was completed on the 30th day. As a result of these processes infection did not penetrate through the wound and the leaf remained healthy.

1411. (Hibbs, E. T.)
Cabbage "bronzing" caused by thrips.
Ia Fm Sci., 1957, **12**(3): 7.

Immature *Thrips tabaci* seemed to cause the most damage to cabbage leaves, and was not readily controlled by 14 weekly applications of several insecticidal sprays. Foliar sprays of heptachlor, dieldrin and parathion showed promise.

1412. Konvička, O.
Skladovatelnost zelí. Zjištění korelačních vztahů mezi skladovatelností a jinými vlastnostmi. **(Storage quality of cabbage. Establishment of correlations between storage quality and other characteristics.)** [Russian summary 2 pp.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1957, **30**: 559-84, bibl. 11, illus.

Work at the Vegetable Research Institute, Olomouc, has shown that the storage of cabbage is affected by annual weather conditions during storage and by varietal characteristics. Positive correlations were found between the refractive index of juice, length of vegetation period, cellulose content of fresh matter and suitability for storage. No direct relationship was found between the length of the stalk within the head and keeping quality. Morphological characters of interest to breeders are described and schematically and photographically illustrated.

1413. Konvička, O., and others.
Prošetření vlastností československého zelí se zřetelem na jeho zpracování mléčným kysáním. **(An investigation into the quality of Czechoslovak cabbage, with reference to processing by lactic fermentation.)** [Russian summary ¾ p.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1957, **30**: 605-32, bibl. 19, illus.

Results are given of complex studies on the morphology of cabbage heads, their chemical composition, the microbiological process of fermentation and the quality of the fermented product.—Veg. Res. Inst., Olomouc.

Celery.

See 1076, 1378, 1516, 1546 l.

Cucurbits.

(*See also* 1371, 1373, 1379, 1545i, x, 1546p, v, 1998q.)

1414. Šuničev, S.
A study of the biological characteristics of cucumbers grafted on squash and of those grown on their own roots. [Russian.]
Sb. stud. nauč.-issled. Rabot Mosk. s.-h. Akad. im. K. A. Timiryazeva, 1956, No. 5, pp. 189-93, from *Ref. Ž.* (*Biol.*), 1957, No. 15, Abstr. 64,909.

In trials in Moscow grafting cucumbers on squash made it possible to obtain high yields of both fruit and seed even from such late types as Japanese, Chinese and Indian cucumbers. The seed was of good quality and produced progeny of improved cold resistance.

1415. Vorob'eva, N.
The effect of pre-sowing treatment of seeds with biogenic stimulants on the growth and development of cucumbers. [Russian.]
Uč. zap. Leningr. gos. ped. In-ta, 1955, **109**: 307-10, from *Ref. Ž.* (*Biol.*), 1957, No. 15, Abstr. 64,582.

Cucumbers from seed soaked in an extract of aloe at 50% concentration for 4 hrs at 20–22° C. were grown in water culture. The plants grew to 4 times the height of the controls and flowered during unfavourable winter conditions. Of the varieties used the best results were obtained with Tepličnye klinskie. Accelerated growth and development due to biogenic stimulation is discussed.

1416. Shimokawa, M., and Sugiyama, C.
Experiments on forcing cucumber. No. 3. On the method of ventilation and utilization of electric heat. [Japanese, with English summary ¼ p.]
Bull. Kanagawa agric. Exp. Stat. hort. Sect., 1957, No. 5, pp. 39-42.

Soil heating in protected (tunnel) cultivation of Japanese cucumbers resulted in yield increases of 10–30%. The standard method of ventilation was the most satisfactory.

1417. Dodillet, H.-J.
Das Lichttemperaturverhältnis bei Gurken und Kohlrabi. **(The light-temperature ratio for cucumbers and kohlrabi.)**
Gartenwelt, 1958, **58**: 11-12, bibl. 1.

The optimum air temperature for cucumber growth when light intensity was above 4,000 lux was about 26–27° C., while for kohlrabi it was 21–23° C. In practice, the most satisfactory temperature range for cucumbers was 18–27° C. and for kohlrabi 13–21° C., according to light intensity. The varieties tested were Spot-resisting Zwaan's Specialzucht cucumber and Wiesmoor Weisser Treib kohlrabi.

1418. Ito, H., and Saitô, T.
Factors responsible for the sex expression of Japanese cucumber. (VII) Effects of long day and high night temperature treatment applied for a short period at the various stages of seedling development on the sex expression of flowers. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1957, **26**: 149-53, bibl. 1.

Cucumber seedlings were given long days (15 hours) and high night temperatures (30° C.) for 2 to 4 days at each stage of their development, and the effect on sex expression was observed. Treatment applied just before sexual differentiation of the flower primordia resulted in the production of staminate flowers. [For part VI see *H.A.*, 28: 424.]

1419. Hårdh, J. E.
On the calcium uptake of glasshouse cucumber.
Maataloust. Aikakausk., 1957, **29**: 238-42, bibl. 5, illus.

Studies with radioactive calcium showed that the Ca contents of the upper leaves of cucumber plants were about the same, whether the plants had received a large or small amount of Ca, but that the former plants were healthy in appearance whereas the latter showed Ca deficiency symptoms. It is suggested, therefore, that the effect of Ca might be associated with the assimilation processes, which are more intensive in older than in young leaves. Ca deficiency symptoms only appear in the meristematic zone if the older leaves contain insufficient Ca. Radiographs showed that Ca accumulates in clearly separated pits, which occur more frequently in the leaves than in the stem. It is considered that the main function of Ca in cucumber is to neutralize the harmful by-products of CO_2 assimilation.—Hort. Res. Inst., Piikkiö.

1420. Mazaeva, M. M.
The dates and technique of magnesium application. [Russian.]
Agrobiologija, 1957, No. 3, pp. 125-9, illus.

Plants studied included watermelon, cucumber and hemp. Deficiency symptoms, content in various plant organs, interaction with Ca, effect on yield and application of Mg are discussed. For the best results Mg should be applied before sowing and shallowly worked into the soil. The application of the nutrient in a readily available form such as $MgSO_4$ when deficiency symptoms appeared was also effective, the earlier the treatment the more effective.

1421. (Peterson, L.)
Improved practices raise melon yields.
Ia Fm Sci., 1957, **12**(3): 10.

Melon plots receiving animal manure produced greater yield increases than plots receiving no manure. More frequent irrigations resulted in higher yields on manured and non-manured plots. Effective weed control was obtained by pre-emergence sprays of Alanap-3.

1422. Mačavariani, I. F.
The effect of irrigation on the sugar content of water-melon. [Georgian, with Russian summary.]
Tr. In-ta Polevodstva AN GruzSSR, 1956, **9**: 249-58, from *Ref. Ž.* (*Biol.*), 1957, No. 15, Abstr. 64,912.

In arid regions of Georgia on sandy, permeable, skeletal soils irrigation increased the sugar content and yield of water-melons. The highest percentage of total sugars (fructose, glucose and saccharose) was obtained when irrigation was carried out at 70% soil moisture capacity. At excess soil moisture the yield continued to increase but the sugar content declined.

1423. Colbran, R. C.
Nematode control in pumpkins.
Qd agric. J., 1957, **83**: 499-501, illus.

In Queensland three species of root-knot nematodes (*Meloidogyne javanica*, *M. hapla*, *M. incognita*) may be controlled by soil fumigation with EDB (12½% v/v). Cover crops of velvet beans, Sudan grass and *Crotalaria* also reduce nematode populations.

1424. Nishida, T., Bess, H. A., and Ota, A.
Comparative effectiveness of malathion and malathion-yeast hydrolysate bait sprays for control of the melon fly.
J. econ. Ent., 1957, **50**: 680-4, bibl. 11.

When malathion and malathion-yeast hydrolysate bait sprays were applied residually to individual cucumber and melon plants for melon fly (*Dacus cucurbitae*) control, the baited spray gave a higher kill than the non-baited. The period of residual effect of both sprays was short, about 1 to 2 days. In field tests there were no significant differences in fly population or fruit infestation between baited and non-baited plots.—Hawaii agric. Exp. Stat., Honolulu.

1425. Ogle, W. L., and Christopher, E. P.
The influence of maturity, temperature, and duration of storage on quality of cantaloupes.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 319-24, bibl. 15.

In these experiments with 3 varieties of cantaloupes commonly grown in the Northeast it was found that the half-slip stage of maturity was best from the standpoint of keeping quality, but not for soluble solids and flavor. The full-slip, green stage of maturity was best where melons were held from 5 to 10 days in storage, and the best temperature of storage was 32° F. There was good correlation between firmness and keeping quality with all variables tested. [Authors' summary.]—Univ. Rhode Island, Kingston.

Legumes.

(*See also* 1019, 1022, 1024, 1038, 1042, 1047, 1048, 1058, 1081n, t, 1296, 1370, 1381, 1545a, b, d, g, m, q, t, u, w, 1546b, m, 1951.)

1426. Pea Growing Research Organization Ltd.
Report of the Pea Growing Research Organization Ltd. for 1956, Yaxley, 1957, pp. 38.

The Home Grown Threshed Peas Joint Committee was wound up during 1956 and superseded by the Pea Growing Research Organization, which deals with vining peas as well as threshed peas. A report is included on field inspection and grading under the Dried Pea Seed Approval Scheme. Field experiments reported include: *Date of sowing:* Results of 4 years' trials show that threshing peas should be sown as early in March as soil conditions permit, or even in late February. *Vining pea studies:* Varieties and date of sowing for canning. *Downy mildew control:* None of the antibiotics or chemicals tested prevented or controlled the disease on marrowfats. *Wild oat eradication:* TCA gave good control when it was applied at 7·5 lb./acre in 60 gal. before the oats germinated and was well incorporated with the soil before seedbed preparation. It caused loss of bloom on pea foliage and some distortion. A higher dosage (10 lb./acre) and later application caused stunted growth and a reduction in yield. With IPC at 3 or 6 lb./acre cultivation after application prevented crop injury but reduced weed control. High purity salts of dinoseb did not cause less damage to peas than the commercial formulation. Dinoseb gave less crop damage and better oat control than MCPA, MCPB or a mixture of the two. *Pea weevil control:* Seed treatment with Thimet or Metasystox in carbon powder at 32 oz. actual product per 100 lb. seed gave some protection against feeding adults and reduced larval damage to the root nodules; at one centre treatment seriously depressed seedling emergence. *Bird repellents:* When applied to pea seedlings neither anthraquinone powder, dieldrin spray nor moth balls exerted any repellent effect on pigeons. *Texture investigations:* There was no definite correlation between date of sowing and texture of canned peas.

1427. Dickinson, D., Knight, M., and Rees, D. I.
Varieties of broad beans suitable for canning.
Chem. Ind. Lond., 1957, No. 46, p. 1503, bibl. 3.

The presence of comparatively large quantities of leuco-anthocyanins makes the great majority of broad bean varieties unsuitable for canning, because on heating they give rise to products with a reddish-brown or grey colour. A method is described for detecting leuco-anthocyanins which has proved a dependable alternative to practical canning tests in determining varietal suitability. The only entirely satisfactory canning variety, Triple White (*syn.* Three times White or Threefold White) was the only one to give a wholly negative reaction to the leuco-anthocyanin test.—Fruit Veg. Canning Quick Freez. Res. Ass., Chipping Campden.

1428. Korohoda, J., and Szmidt, O.
Przyczynek do badań nad fasolą szparagową. (**A contribution to the study of snap beans.**) [English and Russian summaries 1 p. each.]
Roczn. Nauk rol., Ser. A, 1957, **76**: 369-403, bibl. 10, illus.

Results of variety trials conducted in 1952–1954 at Smolice are set out in detail. Of 62 varieties studied 19 were discarded because of low disease resistance and high fibre content. The rest are described, and the best of those suitable for both canning and fresh consumption, and fresh consumption only are listed separately. For breeding in Poland the following lesser known foreign varieties are recommended: Wachs Resista, Wachs Quittling, Logan and Herold.

1429. Ceci, D., and others.
Un programma di ricerche sui piselli per conserve, risultati delle esperienze eseguite nel 1956. (**A programme of research on green peas for canning. Results of the investigations carried out in 1956.**) [English summary.]
Ind. Cons., 1956, **31**: 296-303, from *Food Sci. Abstr.*, 1957, Vol. **29**, No. 1946.

Experiments were carried out with 14 varieties of pea to determine their suitability for cultivation, canning quality and chemical composition. In addition to field trials, total yields of pods and seeds, and partial yields of large, medium and small seeds were calculated. Canning tests were performed. In both fresh and canned products, the contents of total solids, alcohol-insoluble solids, total sugars, reducing sugars, starch and ascorbic acid were determined, and colour (pigments) was measured spectrophotometrically. Organoleptic tests were also made.

1430. Pierpoint, W. S.
The phosphoesterase of pea plants *(Pisum sativum* L.).
Biochem. J., 1957, **67**: 466-72, bibl. 27.

Evidence from a variety of sources indicates that the glycerophosphatase and trimetaphosphatase activities of pea extracts are associated with the same enzyme. This enzyme also splits the phosphomonoester bonds in nucleic acid, phenyl phosphate, pyrophosphate, tetraphosphate, adenylic acid and uridylic acid, in addition to the compounds previously listed. Pyrophosphate is an intermediate in the breakdown of tripolyphosphate by the phosphatase. No intermediates could be detected in the breakdown of trimetaphosphate. The chromatographic heterogeneity of the phosphatase is not caused by the treatment with ammonium sulphate in the course of its purification. [Author's summary. See also *H.A.*, 27: 1586b.]—Rothamsted Exp. Stat.

1431. Lantz, E. M., Gough, H. W., and Campbell, A. M.
Effect of variety, location, and years on the protein and amino acid content of dried beans.
J. agric. Food Chem., 1958, **6**: 58-60, bibl. 10.

Nine amino acids were determined microbiologically in 8 varieties of dried beans grown for 3 years in one location and for 1 year in three locations. Differences due to location and years were highly significant for all amino acids on milligram-per-gram basis and for 7 and 6 amino acids, respectively, on a per-cent-of-protein basis. For some amino acids variety differences, which were significant on a milligram-per-gram basis, were not significant when expressed as per cent of protein. The arginine content was affected much more than that of the other amino acids. [From author's summary.]—New Mexico St. agric. Exp. Stat.

1432. Turner, J. F., Turner, D. H., and Lee, J. B.
Physiology of pea fruits. IV. Changes in sugars in the developing seed.
Aust. J. biol. Sci., 1957, **10**: 407-13, bibl. 21.

Paper chromatographic methods were developed for the estimation of sugars in plant tissues and were used to follow changes in some individual sugars during the development of the pea seed. Sucrose was the predominant sugar present in the seeds and there were smaller quantities of fructose, glucose, and galactose. The amounts of fructose and glucose were approximately equal at all stages of development. The sucrose, fructose, and glucose contents of the seed increased in the early stages of development but decreased during the phase of rapid starch synthesis. The galactose content increased to a maximum at a later stage than the other sugars estimated. The concentrations of sucrose, fructose, and glucose in the seeds were compared with the concentrations in the leaves, stems and hulls. The possible significance of the changes in sugars in relation to the metabolism of the pea seed is discussed. [Authors' summary. For part III see *H.A.*, 28: 433.]—Plant Physiol. Unit, C.S.I.R.O., Univ. Sydney.

1433. Rowan, K. S., and Turner, D. H.
Physiology of pea fruits. V. Phosphate compounds in the developing seed.
Aust. J. biol. Sci., 1957, **10**: 414-25, bibl. 30, illus.

The decrease in the value of the ratio inorganic phosphate/hexose monophosphate measured in the extracts of the seed preceded by some days the increase in the rate of starch synthesis. The rate of synthesis of starch in the seed was not closely related to the ratio inorganic phosphate/glucose 1-phosphate. The accumulation of starch after 23 days from flowering was accompanied by decrease in concentration of hexose monophosphate. This decrease, presumably a direct consequence of the starch formation, would explain the accompanying loss of sucrose due to a reversal of the synthetic reactions in which it is formed. The concentration of the phosphorus compounds did not appear to be closely related to the rate of protein synthesis or of respiration. The rate of respiration was not related to the ratio adenosine diphosphate/adenosine triphosphate. Adenosine diphosphate, adenosine triphosphate, uridine triphosphate, and guanosine triphosphate were identified by paper chronmatography in extracts from fresh pea seed. [From authors' summary. For part IV see preceding abstract.]—Plant Physiol. Unit, C.S.I.R.O., Univ. Sydney.

1434. Jamamoto, —.
The effect of temperature on the germination of bean *(Phaseolus vulgaris)* seeds with different moisture contents. [Japanese, with English summary.]
Japan. J. Ecol., 1956, **6**(1): 18-20, from *Ref. Ž.* (*Biol.*), 1957, No. 15, Abstr. 64,564.

Bean seeds were soaked for 2–48 hrs at temperatures of 0–40° C. The germination of seeds with over 5·7% moisture content after 2 hrs soaking at low temperatures was lower than that of those soaked at high temperatures. The germination of dry seed was depressed at high and stimulated at low temperatures. Seed with a high moisture content after soaking for 24–48 hrs at 20 and 30° C. germinated better than that soaked at temperatures under 20° and over 30° C.

1435. Wager, H. G.
The effect of artificial wilting on the carbon dioxide production of developing pea seeds.
New Phytol., 1957, **56**: 230-46, bibl. 6.

Rates of carbon dioxide emission are shown graphically for turgid and wilted pea seeds of various ages under aerobic and anaerobic conditions. The results were distinctly modified by removal of the testas and by soaking dried seeds.—Low Temp. Res. Stat., Univ. of Cambridge, and D.S.I.R.

1436. Ziver, A.
Distancia de siembra y cantidad de semilla en porotos. **(Spacing and seeding rate for beans.)** [English summary ½ p.]
Agric. téc. Chile, 1956, **16**: 36-42.

In a 3-year experiment with a dwarf, a medium bushy and a climbing variety of bean there were no significant yield differences for the three seeding rates and three row spacings tested for each. Until further studies are completed on the interaction of the two factors, the recommendations are: 200 kg. of seed per ha. and 0·5 m. between rows for the dwarf variety Tórtola, 150 kg. and 0·5 m. for the bushy variety Michelite, and and 125 kg. and 0·6 m. for the climbing variety Coscorrón.

1437. Vidvei, E.
Orienterende såmengdeforsøk i margerter. **(On the rate of sowing marrow-fat peas.)**
Gartneryrket, 1958, **48**: 76-7.

Preliminary trials showed that 15 kg./100 sq. m. may be sufficient for varieties with small seed, while over 40 kg. were required for varieties with large seed. The trials are being continued.—Inst. Veg. Cult., agric. Coll. Norway.

1438. ELIZONDO C., G., AND RICHARDSON, R. W., JR.
Densidad de siembra para el chícharo. **(Sowing density of peas.)**
Agric. tec. México, Winter 1956-57, No. 3, pp. 22-3, 31, illus.

The trials were carried out with canning variety Alaska on badly drained clay soil, with the rows 75 cm. apart. Seven sowing densities, ranging from 40 to 120 kg./ha., were tested. The yields per ha. of fresh pods and of dry seed were both increased with increase in sowing density. For economic reasons the sowing rates recommended on the basis of these trials are 100 kg./ha. for pod production and 90 kg./ha. for seed production.

1439. GULLINE, H. F., AND WALKER, R.
The regeneration of several pea apices.
Aust. J. Bot., 1957, **5**: 129-36, bibl. 15, illus.

Successful graft unions between meristematic tissues have been made in apices of the pea, *Pisum sativum* L. A technique for preventing desiccation of apices during and after the operations was developed. Apical segments ranging from about 200μ down to 50μ in depth were successfully grafted back to their parent plant. The subsequent development of grafted apices was completely normal. These experiments show that a complete shoot can be regenerated from an apical segment less than one-thousandth of a cubic millimetre in volume, containing about 600 cells. This is smaller than any graft previously recorded. [Authors' summary.]—Univ. Tasmania.

1440. MOORE, T. C.
Effect of gibberellic acid on the growth of pea seedlings when imbibed through the seed coat.
Nature, 1958, **181**: 500, bibl. 1.

A typical growth stimulation response was obtained by saturating the vermiculite, in which seeds of a dwarf pea variety were sown, with a 1·0 mg./l. solution of gibberellic acid, and also by allowing seeds to imbibe the solution before sowing.—Univ. Colorado, Boulder.

1441. LOCKHART, J. A.
Studies on the organ of production of the natural gibberellin factor in higher plants.
Plant Physiol., 1957, **32**: 204-7, bibl. 9.

It has been demonstrated that applied gibberellin can replace almost completely the stem tip in promoting the elongation of the subapical region of the pea stem. This effect of the gibberellin cannot be replaced by IAA. It is concluded that the natural gibberellin factor of the pea plant is produced in the stem tip. Gibberellin cannot replace either the roots or cotyledons in the promotion of stem growth. Grafting experiments indicate that the natural gibberellin does not reach the stock across a graft, at least until after tissue union has occurred. [Author's summary.]—Calif. Inst. Tech., Pasadena.

1442. WELLER, L. E., AND OTHERS.
The effect of gibberellic acid on enzyme activity and oxygen uptake in bean plants *(Phaseolus vulgaris)*.
Plant Physiol., 1957, **32**: 371-2, bibl. 13.

Young bean plants 96 hours after the application of 10 micrograms of gibberellic acid to the apex of the epicotyl showed on a fresh weight basis that phosphatase activity was increased in the leaves and stems of the treated plants. No differences could be detected for α-amylase and phosphorylase. Treatment with gibberellic acid resulted in a decrease in activity for β-amylase in the leaves and stems, for pectin methyl-esterase in the roots, for oxygen uptake in the first internode, and an increase for β-amylase in the roots. On a plant part basis, however, the oxygen absorption was greater in the internodes of the treated plants. [Authors' summary.]—Michigan State Univ., East Lansing.

1443. GHILLINI, C. A.
Alterazioni morfo-isto-citologiche prodotte dal 2,4-D in piante di fagiolo. **(Morphological, histological and cytological abnormalities produced in bean plants by 2,4-D.)** [English summary ½ p.]
Ann. Sper. agrar., 1957, **11**: 1177-98, bibl. 15, illus.

The effects of 0·075–0·2% sprays of 2,4-D on young runner bean plants are very clearly shown in photographs. One striking response is abundant formation of adventitious roots.

1444. QUANTZ, L.
Über das Auftreten des Gurkenmosaikvirus auf Erbsen. **(The occurrence of cucumber-mosaic virus in peas.)**
Angew. Bot., 1957, **31**: 166-73, bibl. 12, illus.

The virus isolated from peas grown in different regions of Western Germany closely resembled cucumber-mosaic virus in its effects on cucumber, tobacco and other hosts. Of 50 pea varieties tested, all were susceptible, 36 being seriously affected.

1445. LÓPEZ MENDIBELSO, A.
Efectividad de varios fungicidas en al represión del "damping-off" y de la pudrición de semillas de fríjol (*Phaseolus vulgaris* L.). **(Effectiveness of various fungicides in controlling damping-off and seed rot of beans *(Phaseolus vulgaris)*.)** [English summary ½ p.]
Acta agron. Palmira, 1957, **7**: 141-63, bibl. 26, illus.

Species of *Sclerotium*, *Fusarium* and *Rhizoctonia* were satisfactorily controlled by treating bean seeds with Agros, Ortho Seed Guard and Orthocide 75. Less effective control was given by Phygon, Arasan and Semesan, and Agallol, and Granosan and Spergon SL were unsatisfactory. [The table naming active ingredients of the fungicides used appears to have been disarranged in printing.]

1446. YERKES, W. D., JR., AND TELIZ ORTIZ, M.
Razas de antracnosis en México. **(Strains of anthracnose in Mexico.)**
Agric. tec. México, Winter 1956-57, No. 3, pp. 8-9, 34-5, illus.

Eleven physiological strains of *Colletotrichum lindemuthianum* have been identified in Mexico. The most resistant french bean varieties tested were Canario 101, 102 and 103, which were attacked by only 2 strains. The most susceptible variety was Amarillo 153, attacked by 10 strains.

1447. Janýška, A.
Moření semene hrachu proti anthraknose. **(Pea seed treatment for anthracnose control.)** [Russian, English and German summaries ¾ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1957, **30**: 993-1018, bibl. 20, illus.

Hot water treatment at 50–51° C. for 5–10 min. substantially reduced *Ascochyta pisi* infection, but germination in the field was also reduced. Infection was also reduced by soaking the seed in various fungicides, the best results being obtained with 0·2% suspension of chloranil for 20 hours, germination not being affected. A method of determining the degree of infection in pea samples is described.

1448. Ujević, I.
Nový způsob boje proti *Colletotrichum lindemuthianum* Sacc. et Magn. (Bri. et Cav.) původci anthraknosy fazolů. **(A new method of controlling bean anthracnose.)** [Russian and English summaries ¾ p. each.]
Věd. Práce výzk. Úst. rostl. Vyroby ČSAZV, 1957, No. 3, pp. 187-211, bibl. 78, illus.

Soaking of infected bean seed improved germination and growth and reduced fungus occurrence. The best results were obtained by soaking in water at 18–22° C. for 15 hours followed by 47–48° C. for 25 minutes. Yields from treated seed were much higher than those from untreated.

1449. Bocanegra Salazar, S., and Sánchez, J. L.
Resistencia a las enfermedades del frijol mas comunes en al Costa Central. Campãna 1956. **(Resistance to the commoner diseases of beans in the central coastal region [of Peru]. Trials in 1956.)**
Inf. mens. Estac. exp. agric. La Molina, 1957, **31**(361): 11-14.

Varietal tests showed 9 varieties to be resistant to mildew (*Erysiphe polygoni*) and 10 resistant to the nematode *Heterodera marioni*. Resistance to both was found in 4 varieties.

1450. Fritzsche, R., Wolffgang, H., and Opel, H.
Untersuchungen über die Abhängigkeit der Spinnmilbenvermehrung von dem Ernährungszustand der Wirtspflanzen. **(Studies on the relationship between the nutritional status of host plants and the multiplication of spider mites.)** [English summary 13 lines.]
Z. PflErnähr. Düng., 1957, **78**: 13-27, bibl. 20.

On bean plants grown in a variety of nutrient solutions the rate of *Tetranychus urticae* multiplication increased in the case of K, P and N deficiencies, K deficiency having the greatest effect. Leaf analysis showed the following factors to be favourable to mite multiplication: (1) An increase in total N content, but especially in the insoluble N compounds and in the content of glutamin and glutamic acid; (2) an increase in the content of reducing sugars. These results were confirmed by field trials in which it was found that differences in infestation between two bean varieties receiving the same fertilizer treatment were associated with differences in the sugar and nitrogen contents of the leaves.—Inst. Phytopath., Aschersleben.

1451. Rodriguez, J. G., Chen, H. H., and Smith, W. T., Jr.
Effects of soil insecticides on beans, soybeans, and cotton and resulting effect on mite nutrition.
J. econ. Ent., 1957, **50**: 587-93, bibl. 24.

The effects of DDT, BHC, lindane, aldrin, dieldrin and chlordane as soil insecticides on plant composition were investigated. The plants were grown in pots in the greenhouse and the N, P and K contents were correlated with mite populations, in the case of Black Valentine beans, *Tetranychus telarius*. On beans DDT led to decreased N and P at a 5 to 100 lb. range, then at the higher levels to an increase in these elements and a decrease in mites. K, which also fell, was generally positively correlated with mite development. BHC affected plant composition strikingly and lindane less so; however, mite development was increased by BHC at levels as high as 160 lb./a. In the lindane test, mite development was correlated negatively with N and P and positively with K. Aldrin and dieldrin as compared with the control resulted in slightly less N and P and an increase in mites. Chlordane affected a typical mite-N reaction in that N increased as mites decreased up to 160 lb./a. and the curves then reversed directions. [From authors' summary.]—Univ. Ky, Lexington.

1452. Dolinka, B.
Adatok a borsóormányos *Aoromius* (*Tychius*) *quinquepunctatus* L. bionómiájához és ökologiájához. **(A contribution to the bionomics and ecology of *Aoromius (Tychius) quinquepunctatus*.)** [English and Russian summaries ¼ p. each.]
Növénytermelés, 1957, **6**: 71-6, bibl. 4, illus.

Results of laboratory trials indicate that the weevil infesting peas could be controlled by dusting with Agritox (10% BHC), Nikerol 10 and 20 (10 and 20% DDT) or Duolit (10% DDT) before flowering, and with toxaphene during flowering.—Agric. Res. Inst., Hung. Acad. Sci., Martonvásár.

1453. Franssen, C. J. H.
De levenswijze en de bestrijding van de tuinboonkever. **(Biology and control of bean weevil.)** [English summary ½ p.]
Meded. Inst. PlZiekt. Onderz. **142**, 1956, pp. 75, bibl. 51, illus.

Control of the adults of *Bruchus rufimanus* on broad beans may be obtained by sprays of DDT, parathion or dieldrin; parathion will also control *Aphis fabae*. The crop must be sprayed when the petals of the lowest flowers start to fade; at this stage there is a high adult population but no eggs are laid until the pods are formed. Spraying is not recommended when the temperature is below 17° C.

1454. Stobiecki, W., and Pociej, J.
Wyniki badań nad zwalczaniem strąkowca grochowego przy pomocy promieni podczerwonych. **(Results of investigations on controlling *Bruchus pisorum* by infra-red rays.)** [English and Russian summaries ½ p. each.]
Roczn. Nauk rol., Ser. A, 1957, **75**: 233-44, bibl. 9, illus.

Infra-red rays gave good control of pea weevil, *Bruchus pisorum*, infesting stored pea seed, and may possibly be used for treating other seeds. Treatment of the seed of the pea varieties Bronowicki and Lincoln for 70 sec. gave 99% control of the weevil and slightly improved germination. The cost of the treatment is compared with that of accepted methods of pea weevil control.

1455. Cavalli, L. M.
Straordinaria comparsa di *Pachyrhina pratensis* L. nel territorio di Piacenza. **(The unusual occurrence of *Pachyrhina pratensis* in the Piacenza district.)**
Inf. fitopat., 1957, **7**: 304, illus.

The crane fly severely damaged pea plants. Satisfactory control was achieved by dusting the soil with 40–50 kg. of BHC per ha. and harrowing it in. Other measures advised are deep ploughing to prevent the emergence of adults from pupation, and the use of barium fluosilicate baits.

1456. Schrumpf, W. E., and Pullen, W. E.
Mechanical snap bean picker on trial.
Me Fm Res., 1957, **5**(3): 11-14, illus.

Bean-harvesting machines picking 2 rows at a time and with 3 operators were tested in 3 locations. Results suggested that rows should be 38 rather than 36 in. apart, that soil should be rolled after planting for a level surface, and that weeds should be chemically controlled to avoid ridging caused by the use of cultivators.

1457. Heintze, K.
Veränderungen der grünen Erbsen bei der Konservierung. I. Über einige Veränderungen der grünen Erbse nach dem Pflücken bis zum Eindosen. **(Changes in green peas during preservation. I. Some changes in the green pea from harvesting up to canning.)**
Industr. Obst- u. Gemüseverw., 1957, **42**: 151-4, from *Food Sci. Abstr.*, 1957, Vol. **29**, No. 1945.

Sugar content and acidity were determined in peas of the varieties Salzmünder Grüne and Van Waverens Juwel, when fresh and after storage for 6 hours at 40° C. or in ice-water. Sugar, ascorbic acid and acidity were determined in peas of various grades of maturity. At maturity the contents of sugar, naturally occurring acids and ascorbic acid all tended to decrease. In peas stored in the pod the sugar content increased slightly; during storage or transport of shelled peas for several days in hot weather, however, part of the sugar was used up in respiration and acid fermentation, and the acidity consequently increased. Loss of sugar and increase of acidity could be much reduced if the peas were stored or transported in crushed ice or ice-water. Although large losses of ascorbic acid occurred during storage of peas in the pod for 2 days, the loss in shelled peas was insignificant during storage for several hours under any of the experimental conditions.

Onions and garlic.

(*See also* 1050, 1072, 1545p, z, 1546a, w.)

1458. (Cornejo Aizperrutia, J.)
Cultivo de la cebolla. **(Onion growing.)**
Rep. Inst. nac. Invest. agron. Madrid 1955–1956, 1957, pp. 105-6.

In factorial N, P, K trials on onions where amounts of fertilizer applied per ha. were 600 kg. of ammonium sulphate, 720 kg. of superphosphate and 260 kg. of potassium chloride, N+P gave the highest yield and K produced less than the unfertilized control. Keeping quality was highest in bulbs grown without fertilizer or with P only. Yields from N+P+K were not far below those from N+P. Planting 3 instead of 2 rows per ridge, i.e. 363,000 instead of 242,000 plants per ha., increased the yield by only 23·4% owing to formation of smaller bulbs.

1459. Konvička, O.
Vyšetření odrůd kuchynské cibule (*Allium cepa*) ceskoslovenského sortimentu k produkci sazeček. **(Testing Czechoslovak onion varieties for their suitability for set production.)** [Russian and German summaries ¾ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Vyroba, 1957, **30**: 645-58, bibl. 19, illus.

The size of sets and conditions of storage had greater effect on bolting than did the variety. The lowest percentage of bolting was obtained from small sets stored in a thermostat at about 20° C.—Veg. Res. Inst., Olomouc.

1460. Singh, D.
Do fertilized onions store well?
Indian Fmg, 1957, **7**(5): 31.

No effect on onion storage quality was observed from applications of sulphate of ammonia alone or in combination with farmyard manure to the growing crop.

1461. (Kehr, A. E., and Horton, J. C.)
Soil treatment stops onion smudge.
Ia Fm Sci., 1957, **12**(3): 8-9.

In preliminary tests low levels of pentachloronitrobenzene added to the soil have controlled smudge in storage on white-skinned onion varieties.

1462. Shirck, F. H.
Experiments for the control of the onion maggot.
J. econ. Ent., 1957, **50**: 577-80, bibl. 1, illus.

Aldrin, chlordane, DDT, dieldrin, heptachlor, isodrin, lindane, parathion, and toxaphene were tested as dusts, dips, soaks, sprays, and drenches for control of the onion maggot (*Hylemyia antiqua* (Meig.)) on onions grown for bulbs and seed in south-central Idaho from 1951 to 1954. Improvements in yields of seed or the number of undamaged bulbs were noted with several insecticides and methods of application. Coating the seed with aldrin, dieldrin, or heptachlor prior to planting gave best control on bulb crops. Soaking the bulbs in chlordane, heptachlor, or aldrin emulsions gave the best control on seed crops. [Author's summary.]—Ent. Res. Branch, agric. Res. Serv., U.S. Dep. Agric.

1463. Passlow, T.
Control of *Thrips tabaci* Lind. in onion crops in the Lockyer valley.
Qd J. agric. Sci., 1957, **14**: 53-72, bibl. 11, illus.

Eleven trials using 14 insecticides under irrigated conditions were conducted. Dieldrin, endrin, DDT, parathion, BHC, chlordane and toxaphene were all efficacious, in that order, in reducing thrips populations. In one year's trials dieldrin applications increased yields but large yield increases were not consistently obtained. Irrigation ensures rapid growth and reduces thrips damage so that the use of insecticides is now hardly necessary.

1464. RICHARDSON, B. H.
Control of onion thrips in the Winter Garden area of Texas, 1956.
J. econ. Ent., 1957, **50**: 504-5, bibl. 2.

Onion thrips (*Thrips tabaci*) was very satisfactorily controlled by the phosphorus insecticides Chlorthion, parathion, methyl parathion, Guthion, malathion and Diazinon, less effectively by combinations of phosphates and chlorinated hydrocarbons such as malathion plus dieldrin or malathion plus heptachlor, and showed definite resistance to chlorinated hydrocarbons alone.

1465. UŠAKOVA, E. I., AND ERŠOV, I. I.
Trials on growing perennial tree onions in the greenhouse. [Russian.]
Sad i Ogorod, 1957, No. 12, pp. 24-6, illus.

Aerial bulbils of the Gribovsk type Egyptian onion planted in the greenhouse in the winter produced spring onions at a temperature of 7–8° C. in 4–5 weeks, and at 18–20° C. in 2–3 weeks. The flavour of the green tops of the Gribovsk onion was as good as that of the Bessonovsk onion grown from setts and they had higher dry matter, sugar and vitamin C contents.

1466. ITAGI, T., AND HIKI, S.
Planting distances for welsh onion *Allium fistulosum*). [Japanese, with English summary ½ p.]
Bull. Kanagawa agric. Exp. Stat. hort. Sect., 1957, No. 5, pp. 55-60, bibl. 7.

Welsh onions were planted at distances ranging from 12 to 1·5 cm. Growth in the closely-planted plots appeared more vigorous early in the season, but the widely-spaced plants grew more vigorously later. High total yields were obtained from closely-planted plots, but individual bulb weight was much greater with wider spacing. The diameter of the blanched portion increased with wider spacing, but in general the blanched portion was longer with close planting. The most suitable planting distance seemed to be 3–6 cm.

1467. WEISBERGER, A. S., AND PENSKY, J.
Tumor-inhibiting effects derived from an active principle of garlic *(Allium sativum)*.
Science, 1957, **126**: 1112-14, bibl. 10.

Extracts of garlic are known to contain a powerful bactericidal agent, allylthiosulphinic allyl ester, formed by the interaction of an enzyme, alliinase, and a substrate, S-allyl L-cysteine sulphoxide, present in garlic bulbs. A more stable diethyl analogue of this agent was found to inhibit tumours in mice. Both the bactericidal and the tumour inhibitory effects appear to be related to the presence of the –SO–S– linkage and may be the result of –SH inactivation.—Dep. Med., West. Reserve Univ., Cleveland, Ohio.

Rhubarb.

1468. FRY, W. G.
Experiments with rhubarb forcing.
Exp. Hort., 1957, No. 1, pp. 8-11.

Manuring: Applications of nitro-chalk, superphosphate and sulphate of potash, singly or in various combinations, to rhubarb in the forcing shed did not result in any significant differences in crop yield. When applied in the field from time of planting until forcing, N alone or in combination with P and K increased yield, but P and K alone were ineffective. There was very little difference in quality and earliness between the treatments. In another experiment a good yield increase and a somewhat earlier crop was obtained from N application in the season preceding forcing, but little benefit from N dressings during the first year of growth. No definite conclusions could be drawn on the optimum rate of N application. *Dormancy:* Preliminary tests on date of lifting in relation to soil temperature indicated that roots need to be exposed to a low "starter" temperature, in this case about 38° F. at 6 in. soil depth, before they will respond satisfactorily to forcing. This temperature effect may be cumulative. There was also evidence that a resting period is required, either before or after lifting, before forcing.

Root crops.

(*See also* 1304, 1382, 1400, 1403, 1417, 1546m.)

1469. MATSUBARA, S., AND SAWACHI, N.
Studies on the successive cropping of root vegetables (I). [Japanese, with English summary ¼ p.]
J. hort. Ass. Japan, 1957, **26**: 141-8, bibl. 9, illus.

Growth and yield of taro [*Colocasia esculenta*] were severely reduced after 2 years of successive cropping. The reduction was partly a result of low exchangeable Ca and increased soil acidity. Edible burdock [*Arctium lappa*] was injured during successive cropping by a build-up in the nematode population. Carrot quality was improved during successive cropping, but the soil nematode population increased. Root length and growth of Japanese radish were improved after 10 years of successive cropping.

1470. BANGA, O., DE BRUYN, J. W., AND VAN BENNEKOM, J. L.
Praktijkproeven vroege kroten 1955–1956. **(Variety trials with early red beet, 1955-1956.)** [English summary ¼ p.]
Meded. Dir. Tuinb., 1957, **20**: 774-9.

Twelve selections of Egyptian types have been recommended for early culture. Short top types are suitable for growing under glass, and types with medium sized top are more adapted for early cultivation in the open.—Inst. Vered. Tuinbouwgewass., Wageningen.

1471. JACKSON, A. A.
A bolting-resistant strain of Detroit beet.
J. hort. Sci., 1958, **33**: 39-42, bibl. 3.

A commercial stock of Detroit Dark Red beet was selected in the field for reduction in bolting. Over the period 1948–1955 four generations of seed were so treated, the last two of which were also selected for quality (shape, colour, tenderness of flesh). In 1956, a season which was highly favourable to bolting in early beet crops, the percentage of bolters in the improved strain at maturity was only about one-quarter of that shown by the commercial strain and this advantage was obtained without loss in yield of the non-bolted plants. [Author's summary.]—Wye Coll., Kent.

1472. Nejman, G. B.
Sowing carrots and beetroot in groups on the square. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1957, **22**(7): 16-19, illus.

Both crops sown in groups at 45×45 cm. gave higher yields at a lower cost of production than when drilled in bands of 2 rows 20 cm. apart with 50 cm. between the bands.

1473. Kružilin, A. S., and Švedskaja, Z. M.
The rôle of roots in the phasic development of biennial plants. [Russian.]
Agrobiologija, 1957, No. 3, pp. 118-22, bibl. 10, illus.

Cold treatment of whole roots of carrots and beets, before planting the roots of the detached crowns, resulted in flower spike formation, but cold treatment of detached crowns did not. Cold treated carrot and cabbage seedlings bolted. Treated carrot seedlings grown in short days for 60 days bolted 34 days later than those grown in long days, but cabbage seedlings grown in short days for 30 days were not slower to bolt. The function of and metabolism in the roots during vernalization are discussed.

1474. Kružilin, A. S., and Švedskaja, Z. M.
Changes in sugar content during the vernalization of biennial plants. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1957, **116**: 870-3, bibl. 8, illus.

Low temperature treatment (1–4° C.) increased the total sugar content in the leaves of cabbage, table beet and carrot seedlings and in the storage organs of seed plants. Increases in the individual sugars during low temperature treatment and decreases during subsequent growth are discussed.

1475. Mukula, J.
On the decay of stored carrots in Finland.
Acta Agric. Scand., Suppl. 2, 1957, pp. 132, bibl. 216, illus.

The author lists the pathogenic micro-organisms. Of these *Sclerotinia sclerotiorum*, *Botrytis cinerea*, *Stemphylium radicinum* and *Fusarium avenaceum* were the most important. The sources of contamination and the effects of fertilizers, of age and of variety are discussed. A temperature of 0° C. and 90–95% R.H. proved most suitable for storage, and storage in small lots and thin layers was best. The best fungicide tested was tetrachloronitrobenzene (12 g./100 kg.); dipping into heated paraffin also inhibited rotting. Sprouting inhibitors were also desirable.—Agric. Res. Centre, Tikkurila, Finland.

1476. Rubin, B. A., and Handobina, L. M.
The effect of sodium fluoride on the respiration of healthy carrots and those infected with *Phoma rostrupii*. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1957, **116**: 277-9, bibl. 11.

Sodium fluoride introduced into carrot tissue by vacuum infiltration during storage greatly depressed respiration in healthy roots, had a less depressing effect on the externally healthy tissues of diseased roots and stimulated respiration in necrotic tissues.

1477. Ausland, O.
Gulrotflue (*Psila rosae* Fabr.) og gulrotsuger (*Trioza apicalis* Forst.) bekjempelse. **(Carrot fly and carrot psylla control.)** [English summary 2¾ pp.]
Meld. Stat. Plantevern, 1957, No. 15, pp. 61, bibl. 39.

The carrot fly occurs all over Norway, while the psylla (*Trioza apicalis*) is largely confined to the south and south-east. Combined control of the two pests was achieved by sprays of dieldrin, lindane or parathion, the first two being the most reliable insecticides. Good results against carrot fly were obtained with 2–3 applications at 10-day intervals starting 10 or 12 June, i.e. about a fortnight after the emergence of the first generation. Where parathion was used control of the second generation was improved by a repetition of the treatment. In addition to the chemicals mentioned above, DDT and dilan were effective against the carrot psylla, which required 2–3 applications at 8–10-day intervals from about 10 June onwards. In preliminary trials the addition of dieldrin to a mineral oil herbicide proved successful for the control of carrot fly. Seed dressings with aldrin, lindane and dieldrin at the rate of 100–150 g. of active agent per kg. seed (a somewhat higher dosage in the case of aldrin) gave good results against the first generation of carrot fly. Seed dressing with lindane caused an off-flavour in carrots grown in a sandy soil and harvested early. After 2 years' storage the germination of treated seed remained satisfactory. The trials were carried out in 13 counties for several years, chiefly by the Experiment Station at Landrik.

1478. Williams, W. T., Dore, J., and Patterson, D. G.
Studies in the regeneration of horseradish. III. External factors.
Ann. Bot. Lond., 1957, **21**: 627-32, bibl. 7.

Initiation of new promordia on a freshly-cut root is relatively insensitive to external conditions, and may take place under conditions that inhibit the later stages The latter show a marked temperature optimum for both generation and respiration at 30° C. Moisture is essential, but complete immersion in water is inhibitory; oxygen is essential, and excess (6%) CO_2 without effect. [Authors' abstract. For parts I and II see *H.A.*, 25: 1747 and 26: 2825.]—Univ. Southampton.

1479. Purvis, E. R., and Haenseler, C. M.
Too much nitrogen causes hollow root.
N.J. Agric., 1957, **39**(6): 5, 16.

Excessive supplies of ammonium nitrate, at 240 lb. N/acre, caused an increase in the incidence of centrally darkened or hollow roots in horse radish.

1480. Homola, J.
Brukev k rychlení. Vyšlechtění nové odrůdy a zlepšení agrotechniky. **(Forcing kohl-rabi. Development of a new variety and improvement of cultivation methods.)** [Russian and German summaries 1 p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1957, **30**: 585-604, bibl. 14, illus.

Work in Czechoslovakia during 1947–1954 on the cultivation of kohl-rabi under glass and on breeding is described. Low temperatures in general, low soil temperatures and close spacing increased bolting, and low intensities and short periods of light-induced stem elongation. It is recommended that kohl-rabi seedlings should be raised in warm glasshouses, preferably in pots, to a late stage of development, and that protracted hardening and slow cultivation should be avoided. A new, very early variety called "Pražská bilá k rychleni" (LR 2) [Prague White Forcing] showing high resistance to bolting was developed, and work on a further, hardier variety is in progress.—Veg. Res. Inst., Olomouc.

1481. Oelke, J.
Zur Physiologie der Selbst- und Kreuzungssterilität beim Radieschen (*Raphanus sativus* L.). (On the physiology of self- and cross-sterility in radish.)
Züchter, 1957, **27**: 358-69, bibl. 47, illus.

The sterility reaction in radish was found to be confined to the stigma. Osmotic values in the papillae of the stigma were lowest in buds and in 3–4 day-old (faded) flowers. At bud burst the osmotic value increased markedly to reach its maximum on the first day the flower was fully open. Tubes of otherwise self-sterile, mature pollen grew normally on the stigmata of both closed buds and faded flowers, while pollination failed in the intermediate flower stages. Under normal conditions the age of the pollen was a decisive factor, pollen from flowers less than two days old being sterile. Cross-fertile pollen had a higher suction power than that from self-sterile plants. In the case of selfing optimum fertility occurred after wounding one-day-old stigmata, provided humidity was sufficiently high to permit pollen germination. Inhibiting substances are not involved in the phenomenon of self-sterility in radish.—Pflphysiol. Inst. Freie Univ. Berlin.

1482. El Murabaa, A. I. M.
Effect of high temperature on incompatibility in radish. [Dutch summary 7 lines.]
Euphytica, 1957, **6**: 268-70, bibl. 6, illus.

Clones of radish plants were crossed or selfed at 17° and 26° C. Seed number per fruit and total seed production in cross-compatible plants were higher at 17° C. than at 26° C. In self-incompatible plants fruit set and total seed yield were increased at 26° C., and it is suggested that the incompatibility reaction between pollen and style is weakened at the higher temperature. —Lab. Tuinbouwpl., Wageningen.

1483. (Mahrouki, A. M.)
Grow radish under cool conditions.
Grower, 1957, **48**: 1210.

The best yields and highest dry weights of radish were obtained at 50–70° F., with high moisture and medium day length (11–13 hr.). Shape was best at 50–60° F., with high moisture and long days, and best seed production was obtained at 50–70° F. with long days. At 40–50° F. no bolting had occurred after 50 days.—Cornell Univ.

1484. Kojima, H., Yahiro, M., and Etô, T.
On the influence of the auxins and anti-auxins upon vernalization. [In English.]
J. Fac. Agric. Kyushu Univ., 1957, **11**: 25-35, bibl. 12.

It was found that the application of NAA, potassium indole acetate or TIBA to young Japanese radish seedlings, some of which had had their cotyledons removed, did not encourage early flowering in plants which had not been subjected to low temperatures. Nor did applications of these chemicals increase the percentage of bolting in plants already vernalized.

J.R.L.

1485. Weller, L. E., and others.
Effect of maleic hydrazide on the composition of radishes *Raphanus sativus*).
Food Res., 1957, **22**: 319-22, bibl. 8.

A pre-harvest spray of MH 2,500 p.p.m. prevented deleterious effects of storage on radishes [see also *H.A.*, 26: 3797]. Gross composition and mineral analysis (B, Ca, Cu, Fe, K, Mg, Mn, Na, P, Zn) of radishes harvested 48 hours after treatment and then stored for 168 hours showed the nutritive value of roots to be virtually unchanged; however, after 216 hours' storage changes were apparent. The greatest differences were increases in dry weight and non-reducing sugars and a reduction in Kjeldahl nitrogen.—From *Weed Abstr.*, **6**, No. 1871.

1486. Samra, A. S.
Relative value and mode of action of some fungicides used as seed disinfectants and protectants. [Dutch summary 4 pages.]
Meded. LandbHoogesch. Wageningen, 1956, **56**(5): 1-55, bibl. 81, illus.

Organic mercury compounds were more effective for control of *Alternaria* spp. in radish seed than were thiram compounds. Complete control was not obtained by dust treatments, even at rates of 10 g./kg. seed. Wet treatments with ceresan or germisan gave better results, but with thiram no differences between wet and dry treatments were apparent. At concentrations of 1% for 4–8 min. ceresan-wet and germisan-wet did not affect seed viability, and gave almost complete disease control. Ceresan-wet applied immediately before sowing did not penetrate the seed coat, and did not control deep-seated infections; when treatment was followed by 2 weeks' storage the infections were killed but seed viability was severely impaired. Actidione applied at 100 p.p.m. for 8 hours controlled *Alternaria* but was phytotoxic. Rimocidin at 3 concentrations gave complete control of the disease without affecting viability. Neither rimocidin at 200 p.p.m. for 18 hours nor 1% ceresan-wet for 6 min. (without storage) killed the infection immediately after treatment; during subsequent germination, however, *Alternaria* was completely controlled by rimocidin, but not by ceresan.—Lab. Phytopath., Wageningen.

1487. Forbes, A. R., and King, K. M.
Control of root maggots in rutabagas and turnips in British Columbia.
Publ. Canada Dep. Agric. Sci. Serv., Ent. Div. **1026**, 1957, pp. 4, illus.

By spraying rows with 3 pints heptachlor emulsifiable concentrate or 5 pints aldrin e.c. in 100 gal. water; alternatively by applying 2½% aldrin or heptachlor dusts to the rows. [See also *H.A.*, 27: 498 and 3531.]

Salad crops.

(*See also* 1021, 1371, 1382, 1545j, 1546d, j.)

1488. KREUTZ, W., AND SCHUPP, F.
Die Steuerung des Bodenklimas in Frühbeeten durch verschiedene Packungen. **(The control of soil climate in frames by different fermenting materials.)**
Gartenwelt, 1957, **57**: 383-5, 396-7.

Heat distribution by 4 different types of fermenting material was studied and its effect on lettuce as a test crop observed. Temperature measurements showed a steep drop at the beginning of the experiment with town waste, which also had the greatest temperature range during the experiment. The best effect on lettuce yield and quality was obtained with straw, which induced variations in soil temperature between 14° and 22° C. Lettuce development when peat was used was slow.

1489. KOSAR, W. F., AND THOMPSON, R. C.
Influence of storage humidity on dormancy and longevity of lettuce seed.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 273-6, bibl. 4.

When lettuce seed was stored at 10° C. all the seeds were dead after 1 year at R.H.97 or 100%, after 2 years at R.H. 88% and after 4 years at R.H. 67 or 75%. At the highest and lowest humidities a dormancy developed which was apparently associated with deterioration of the seed preceding death. The best viability was obtained at R.H. 46–58%.—U.S. Dep. Agric., Beltsville, Md.

1490. KLEIN, S., AND PREISS, J. W.
Reversibility of the red-far-red reaction by irradiation at different sites.
Nature, 1958, **181**: 200-1, bibl. 5.

Experiments with lettuce seed showed that far-red radiation depresses the red light effect of promoting germination to the same extent, or even more, when applied to the reverse side of the seed as when applied to the same side which has received the red light. The same was true for the reverse sequence of light irradiation. Two possible interpretations are suggested: (1) that the photoreceptor and/or photoproducts may diffuse rapidly after illumination throughout the seed; (2) that although the photoreceptor molecules on one side of the seed remain in the state determined by the first irradiation, illumination of a different site (i.e. involving different receptor molecules) will bring about reversal of the effect caused by the first illumination.—Yale Univ., New Haven, Conn.

1491. ZINK, F. W., GROGAN, R. G., AND BARDIN, R.
The comparative effect of mosaic-free seed and roguing as a control for common lettuce mosaic.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 277-80, bibl. 2.

The use of mosaic-free lettuce seed resulted in a much greater reduction in total percentage of infection at time of harvest than 3 roguings, which in turn was significantly better than 1 or 2 roguings. Roguing by spot treatment with diesel oil plus parathion was slightly more effective than roguing by hoeing.—Univ. Calif., Davis, and Monterey Co. Dep. Agric., Salinas, Calif.

1492. WEBB, F. W.
Antibiotics in the control of plant diseases.
Agriculture, Lond., 1958, **64**: 493-7, bibl. 6, illus.

Griseofulvin, 3% (active ingredient) dust, applied to lettuce houses at 14 lb./acre before planting and 2 or 3 times after planting at monthly intervals reduced losses from *Botrytis* by 50% and enhanced the quality of the lettuces.

1493. HURNDELL, L. C., AND SMITH, H. C.
Ringspot disease of lettuce (and its control).
N.Z. Comm. Gr, 1957, **13**(6): 10-15.

Marssonina panattoniana was controlled by captan and thiram, either as sprays, 2 lb. in 100 gal. at 50–100 gal./acre, or as 6% dusts at 15–30 lb./acre. Wettable powders were used for both sprays and dusts. Applications were made at 10-day intervals, and must commence before the disease appears.

1494. HALL, I. M.
Use of a polyhedrosis virus to control the cabbage looper on lettuce in California.
J. econ. Ent., 1957, **50**: 551-3, bibl. 7.

Virus concentrations of 1, 5 and 10 million polyhedra per ml. applied once or twice by a single-nozzle hand-sprayer at 12 gal. per acre to half-grown lettuce gave very good control of cabbage looper (*Trichoplusia ni*) larvae. Applications of the higher dosages resulted in almost 100% mortality. In future trials side nozzles will be used for better plant coverage, which should result in increased mortality of the younger larvae before they are large enough to cause serious damage. —Univ. Calif. Citrus Exp. Stat., Riverside.

Spinach.

(*See also* 1377, 1546k.)

1495. SNEEP, J.
De stand van de veredeling bij spinazie. **(The position in spinach breeding.)** [English summary 4 pp.]
Meded. Inst. Vered. Tuinbouwgew. **113**, 1957, pp. 198, bibl. 147, illus.

No correlation was found between sex and rate of seed germination or viability. With Utrecht Winter, in which the upper part of the elongated stem of the male plants is leafless, leaf yields from female plants were significantly greater than those from male plants. No yield differences were apparent with Viking, in which the upper stem is leafy. There were no significant differences in weight between the first 4 leaves of male and female plants of Prickly Winter, the first 10 leaves of Utrecht Winter or the first 15 of Viking. Male plants tended to bolt earlier than female. Two types of bisexual flowers have been found, i.e. with divided or undivided perianth. A classification based on flower type is given. Long days and a temperature of approximately 20° C. are the optimum factors for a short life cycle. The acceleration of flowering induced by vernalization is of no advantage, owing to the time lost in treatment. The use of unripe seed, sown immediately after gathering, can save some time in raising the following generation. Vegetative propagation of spinach is not yet practicable. Problems of breeding, including incompatibility, production of desirable horticultural characteristics, disease-resistance and hybrid seed production, are discussed.

1496. DE VILMORIN, R., AND BILQUEZ, N.
Le fer et l'acide oxalique dans les épinards. **(Iron and oxalic acid in spinach.)**
C.R. Acad. Agric. Fr., 1957, **43**: 743-4.

The ash content, and thus oxalic acid content, of spinach increased regularly with age. Fe content varied irregularly from leaf to leaf, but old leaves in general had higher contents than other leaves. [See also *H.A.*, 27: 1539 and 3548.]

1497. GUYER, G. E., REATH, N., AND HAISLEY, K.
The biology and control of the maggot complex associated with spinach.
J. econ. Ent., 1957, **50**: 595-8, bibl. 5, illus.

During studies in Michigan 11 species of flies representing 6 families were reared from infested spinach. A single species, *Scaptomyza graminum*, was responsible for 71% of the population; the remaining population was composed primarily of seed-corn maggot (*Hylemya cilicrura*), false stable fly (*Muscina stabulans*) and *Muscina assimilis*. Applications of granulated materials into the crown area were more effective than conventional spray treatments. Residues in canned spinach sampled 3 days after treatment were generally absent or below the established tolerance for the materials used. The results of both performance and residue analyses indicated that granulated dieldrin and parathion were the most promising materials for control of the maggot complex on spinach.—Mich. St. Univ., E. Lansing, and Gerber Products Co., Fremont, Mich.

Tomatoes and related crops.

(*See also* 1020, 1023, 1028, 1041, 1051, 1063, 1081u, 1370, 1371, 1373, 1377-1379, 1381, 1382, 1545c, g, h, l, o, r, s, v, y, 1546c, f-i, n, o, q, u, 1843, 2034.)

1498. JOHNSEN, J. K., AND VIBSTAD, A.
Sortsforsøk med veksthustomat på Kvithamar 1956-57. **(Variety trials with glasshouse tomatoes at Kvithamar 1956-57.)**
Gartneryrket, 1958, **48**: 95-8.

Several recent F_1-hybrids, especially Weibulls Immuna/56 and Kvithamar F_1, gave markedly higher yields than the standard variety, Potentate A.H.8.

1499. SMITH, P. R., AND WEBB, C. R. M.
"KY1", new tomato suitable for processing.
J. Agric. Vict., 1957, **55**: 581-6, bibl. 2, illus.

The dwarf bush produces high yields of uniform fruit of good colour and solids content. The broad leaves give good fruit cover. In a cropping trial KY1 gave yields of marketable fruit which were greater, though not significantly so, than those of Tatinter or Victorian Dwarf. The yield of Grade 1 fruit was significantly greater than that from South Australian Dwarf.
J.R.L.

1500. ALPAT'EV, A. V., AND POLUMORDVINOVA, I. V.
Morphological-physiological differences in tomatoes in relation to variety and growing conditions. [Russian.]
Agrobiologija, 1957, No. 3, pp. 85-9, bibl. 10, illus.

Examination of the growing point of tomatoes showed that the initiation of the first inflorescence began 10–20 days after germination, during the 2–3 permanent leaf stage. Potassium permanganate and a double dose of monobasic phosphoric acid applied in a nutrient solution hastened flower bud initiation. The application of superphosphate, potassium phosphate, magnesium borate, Mn and Fe to the seedlings also hastened the formation of generative organs and induced early maturity. Temperature during germination and day length and nutrition during early growth did not affect the position of the first inflorescence; in the 6 varieties studied this varied from above the 7th to 10th leaves.

1501. CHUNG, L. S.
Tomatoes in China. A report on the breeding of new strains.
Comm. Gr, 1958, No. 3236, pp. 84-5, illus.

A new strain of tomato has been obtained in China by selection, hybridization and methods based on the theory of inducing variation through altered environmental conditions. In the new strain the inflorescence divides into 2 stems after the appearance of the first flowers, and the fruit is fleshy, of good flavour and with few seeds.

1502. VOSKAN'JAN, S.
Resistance of tomato selections to leaf spot and early blight in the foothills of the western part of the Northern Caucasus. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1957, **22**(7): 25-9, bibl. 5.

From results of resistance trials conducted at Maikop from 1953 to 1955 certain selections of the following varieties are recommended for breeding for resistance to *Septoria lycopersica* and *Alternaria solani*: Dwarf Stone, Beauty, Trophy, Trophy Gold Gelber, Triumph and Ston Feodosijskij.

1503. LA ROTONDA, C.
I problemi tecnologici dell'industria conserviera ed il miglioramento genetico del pomodoro. **(Technological problems of the canning industry and genetical improvement of tomatoes.)**
Ann. Fac. Sci. agrar. Univ. Napoli, 1956/57, **22**: 221-36.

Italian production figures for industrial tomatoes are quoted. The variety S. Marzano is considered ideal for canning, other good varieties being Fiaschella and Re Umberto. Only Pearson and Alba Scarlatta 711, out of 34 American varieties tested, were as suitable as Re Umberto in yield, high sugar content and low acidity. Besides these 3 factors in breeding tomatoes for processing, firm and bright coloured flesh is very important.

1504. MOTTIER, P.-P.
Essais comparatifs de tomates cultivées en serre et en pleine terre. **(Comparative trials with tomatoes grown under glass and in the open.)**
Rev. hort. Suisse, 1958, **31**: 46-7.

Results of the previous year's glasshouse trials [see *H.A.*, 27: 1585x] with Export Wunder and Best of All were confirmed. In the open Fournaise I ripened very early, while Marmande ronde, which produces fleshy fruits in August and September, is suitable for preserving.

1505. Chroboczek, E.
Badania nad wpływem czynników klimatycznych i zabiegów uprawowych na skład chemiczny pomidorów. **(Studies on the influence of climatic factors and methods of production on the chemical composition of tomatoes.)** [English and Russian summaries 3 and 4 pp. respectively.]
Roczn. Nauk rol., Ser. A, 1957, **76**: 169-215, bibl. 60.

Studies were conducted at Skierniewice during 1948–1955 and at Pudliszki and Ziębice from 1950 on factors affecting the contents of (1) dry matter, (2) sugar and acid, and (3) ascorbic acid in processing tomatoes. (1) The highest dry matter content was found in the variety Immun Pudliszkowski, grown both staked and unstaked, without pruning. Dry matter content was correlated with average August temperatures, number of stems, manuring and fruit size. The dry matter content in half-ripe fruits was higher than in red ripe. (2) Simple sugars constituted 95·9% of the total sugar content which was 54·4% of the dry matter. The average total content of acids expressed as citric acid was 0·45% of fresh weight or 8·11% of dry matter. The sugar : acid ratio averaged 7·14 and varied greatly with variety. Factors which increased dry matter and sugar contents also increased the sugar : acid ratio. Fruit picked during the middle of August showed a higher sugar : acid ratio than that picked in September. (3) The ascorbic acid content averaged 31·3 mg./% and varied greatly within the varieties studied and between seasons. In general it was higher in tall than in dwarf varieties but methods of growing, i.e. with or without staking, did not affect it. High rates of fertilizers which increased yields and dry matter content depressed vitamin C.

1506. Cooper, A. J.
Observations on growth trends of the tomato plant throughout the whole of the growing season.
J. hort. Sci., 1958, **33**: 43-8, bibl. 2.

Observations of shoot and leaf growth and fruit development of var. Potentate grown under glass were taken for 3 seasons and of root growth for one season. The pattern of axillary shoot growth appeared to be regular and related to the flower truss positions. A check to all growth occurred in early May and to fruit development between mid-May and mid-June. These checks appeared to be independent of planting date and of management.—Glasshouse Crops Res. Inst., Littlehampton.

1507. Salter, P. J.
The effects of different water-regimes on the growth of plants under glass. IV. Vegetative growth and fruit development in the tomato.
J. hort. Sci., 1958, **33**: 1-12, bibl. 24.

Greatest vegetative growth was obtained with a small fruit load under conditions of high moisture. Conversely, weakest vegetative growth was found with a large fruit load under conditions where the soil was allowed to dry out between irrigations nearly to the permanent wilting point. Water-regimes and fruit load treatments were found to be additive in their effect on vegetative growth. [From author's summary. For part III see *H.A.*, 28: 493.]—Univ. Nottm Sch. Agric., Sutton Bonington.

1508. van Assche, M.
Une application horticole des plastiques: le sachet-godet polythène. **(A use for plastic in horticulture: polythene pots.)**
Rev. hort. Paris, 1957, **129**: 1740, illus.

Young tomato plants grown in polythene film pots showed more top and root growth than those grown in conventional pots, and watering was needed less frequently. Harvesting began 10 days earlier from plants in plastic pots.—École d'Agriculture, Malines.

1509. Soost, R. K., and Rick, C. M.
Effect of varieties of pollen and ovule parents on natural cross-pollination of tomatoes.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 357-65, bibl. 9.

The rate of cross-pollination on male-sterile tomato plants of Pearson, San Marzano and Earliana, as measured by the percentage of flowers that set fruit, varied with the pollen parent variety. Male-fertile plants of San Marzano and Earliana induced significantly higher rates of cross-pollination than Pearson or Red Currant in each of 4 years. The ovule parent also significantly affected the number of flowers that set fruit, San Marzano having a higher percentage set in all years than Earliana or Pearson. Differences in number of seeds per fruit were not large, but as an ovule parent San Marzano had a significantly lower number than the other varieties in all 4 years. Total seed production, however, was higher in San Marzano than in either Pearson or Earliana, owing to the higher proportion of fruits set. As pollen parents Earliana and San Marzano produced higher numbers of seeds per plant than Pearson or Red currant.—Univ. Calif., Riverside and Davis.

1510. Orbea, J. R.
Acción del ácido indolbutírico en la fructificación del tomate. **(Effect of indolebutyric acid on fruit set in tomatoes.)** [English summary ½ p.]
Rev. Fac. Agron. La Plata, 1956, **32**: 149-57, bibl. 17.

Tomato flowers were sprayed with 45% ethyl alcohol, alone or with the addition of IBA at concentrations ranging from 0·05% to 0·3%. Fruit size was progressively reduced with increasing concentrations of IBA, but was increased by alcohol alone. Yields were highest from alcohol treatment, the only other result higher than the control being that from 0·1% IBA. All treatments involving IBA produced about 60% of seedless fruit, of higher quality than normal and with green placental pulp. The very promising effects of 45% alcohol will be further investigated.

1511. Moore, J. F.
N-1-naphthyl phthalamic acid, N-m-tolyl phthalamic acid and other growth regulators applied as whole plant sprays to field-grown tomatoes.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 350-6, bibl. 7.

When N-1-naphthyl phthalamic acid was applied with field spray equipment as a complete plant spray to tomatoes at the first bloom stage, a concentration of 25 p.p.m. gave the best results. Over a 5-year period this gave an average total yield increase of 149%, compared with unsprayed controls. Over a 3-year period marketable yields were increased by an average of 116%. N-m-tolyl phthalamic acid at 750 p.p.m. was tested in 2 years and gave a total yield increase of 80% and a marketable yield increase of 172%. There were no consistent effects on fruit size.—W. Wash. Exp. Stat., Puyallup.

1512. Smith, D. E., and Warren, G. F.
Studies of soluble salts in greenhouse soils.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 501-11, bibl. 17, illus.

Greenhouse experiments were conducted to determine the effect of an excess of various fertilizer salts on the growth of plants and the conductivity of the soil extract. Tomatoes and leaf lettuce were used as test plants. The results were as follows: (1) Excessive amounts of the various fertilizer salts tested were reflected in the conductivity of the soil extract. (2) With the exception of sulphate salts, an electrical conductance of 200×10^{-5} mhos per cm. of a 1 : 2 soil-water extract indicated the approximate lower level at which the various fertilizer salts injured plant growth. With sulphate salts injury did not occur until readings were above 300. (3) On an equal molar basis, the various fertilizer salts increased the conductivity of the soil extract in the following ascending order: monocalcium phosphate; monopotassium phosphate; calcium sulphate; potassium nitrate and chloride; calcium nitrate and chloride and potassium sulphate. (4) On an equal molar basis, the various fertilizer salts decreased plant growth in the following ascending order: monocalcium phosphate and calcium sulphate; monopotassium phosphate; potassium sulphate; potassium chloride; potassium nitrate; calcium chloride and calcium nitrate. (5) Stunting of the plant was the only symptom of excess soluble salts on lettuce. (6) In addition to the dwarfing effect, blossom-end rot of tomatoes increased and the marketable yield decreased as the soluble salts increased. [From authors' summary.]—Purdue Univ., Lafayette, Ind.

1513. Meyer, R. E., Warren, G. F., and Langston, R.
Effect of various anions on the growth and nutrient uptake of bean and tomato.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 334-40, bibl. 15.

Ion uptake studies with tomato, and a potassium salt toxicity study, using bean, were conducted in sand culture in the greenhouse. Chloride depressed radioactive phosphate absorption by tomato plants compared to sulfate, but little difference was noted between levels for either anion. Plants grown in the chloride treatment contained less N than those grown with all-sulfate, but little difference in the total N content per plant was noted because of the significantly greater growth in the chloride cultures. A progressive decrease in bean growth occurred as osmotic concentration increased, but high isosmotic levels of chloride and nitrate resulted in more leafy injury and in somewhat greater growth depression than did phosphate or sulfate. Chloride, in general, increased succulence of tomato and bean plants as compared with sulfate. [Authors' summary.]—Purdue Univ., Lafayette, Ind.

1514. Fuller, W. H., Riley, W. F., and Seamands, D.
Solubility characteristics of nitric phosphate fertilizers in calcareous soils, and comparative effectiveness in greenhouse pot cultures.
J. agric. Food Chem., 1957, **5**: 935-41, bibl. 10.

Four types of nitric phosphate fertilizers and 2 ammonium phosphate fertilizers were applied to calcareous soils in pots using tomato as a test plant. Yields were increased to a similar extent by all the fertilizers except for carbonitric phosphate, which appeared to be less effective than the other sources. In general dry matter production and P contents were less when the fertilizers were applied in bands than when mixed with the soil. Nitrogen uptake was considerably influenced by the method of fertilizer placement.—Univ. Ariz. agric. Exp. Stat., Tucson.

1515. Strømme, E.
Avling og kvalitet av veksthustomater i et faktorielt gjødslingsforsøk med N, K og Mg. **(Yield and quality of glasshouse tomatoes in a factorial experiment with N, K and Mg.)** [English summary 1½ p.]
Forskn. Landbruk., 1957, **8**: 447-66, bibl. 30, illus.

A 2^3 factorial experiment with calcium nitrate, potassium sulphate and magnesium sulphate was carried out with the tomato variety Potentate AH8, the treatments being applied to permanent plots for 4 consecutive years. (1) When potassium was omitted leaf scorch appeared in the second season with symptoms especially pronounced in plots that had received extra N. (2) When Mg was omitted and K applied, Mg chlorosis occurred the same year. The symptoms were more severe with low than with high N. (3) N had a positive effect on yield from the first year onwards, while the omission of K and Mg failed to affect yields in the first three years, although the plants exhibited deficiency symptoms. (4) A high K level in the soil was shown to have a marked positive effect on quality as expressed in the number of blotchy fruits affected with "greenback". Quality was not affected by N or Mg. (5) Applications of N reduced availability of K and Mg in the soil but increased the Mg content of the leaves. K had little effect on the Mg level of the soil but markedly lowered the Mg content of the leaves. (6) Soil analysis at regular intervals during the season is recommended to ensure an adequate supply of K, especially where heavy dressings of N are applied.—Inst. Floricult. Glasshouse Crops, agric. Coll. Norway.

1516. Tiessen, H.
The effects of high analysis soluble fertilizers as interrelated with environmental conditions and cultural practices on the growth and yield of vegetables with special reference to the tomato.
Dis. Abstr., 1957, **17**: 1643-4, being *Publ.* 21,391 of 139 pp.

Greenhouse and laboratory studies indicated that N absorption by tomato plants was influenced more by N concentration in the fertilizer solution than by soil temperature (46–70° F.). Phosphorus absorption apparently occurred at low temperatures (54–62° F.) only at high concentration in readily-available form. A high soluble P content in tomato plants from starter solutions given shortly after transplanting was correlated with subsequent growth and yield. Fertilizer solutions tended to decrease flower abscission and increase fruit set and early yield. Tomato root development was promoted by P and N, while K was as important as N and P in tobacco root development. Earlier maturing tomato varieties showed a greater response to fertilizer solutions than later maturing varieties. Stokesdale tomatoes produced higher yields when N was low, while Longred required high N and high P. Brassicas and celery responded to starter solutions containing high N and P (23–52–0).—Mich. St. Univ.

1517. Petrosini, G.
La nutrizione completa epigeica del pomodoro. **(Complete foliar nutrition of tomatoes.)** [English summary ¼ p.]
Ann. Sper. agrar., 1957, **11**: 1405-18, bibl. 18.

Tomatoes were grown in a sandy loam soil, the controls without fertilizer (except for farmyard manure ploughed into the whole field before planting) and the test plants with either soil or foliar application of N, P and K. Soil treatment consisted of biammonium phosphate and potassium sulphate. The nutrient solution sprayed on the leaves before and during flowering contained mono-ammonium phosphate, urea and potassium sulphate. This mixture was applied either alone or with one of 3 spreaders—ricinolein, caprilic acid or oleic alcohol—each in ethylene oxide. Yields in quintals (100 kg.) per ha. were 198 without fertilizer, 340 with foliar sprays+ricinolein spreader, 350 with foliar sprays without spreader, 358 with soil treatment, 360 with foliar sprays+caprilic acid spreader and 428 with foliar sprays+oleic alcohol spreader. In the following year this last spreader was compared with lauryl alcohol in ethylene oxide and with hexaethylene glycol. Yields in quintals per ha. were 160 without fertilizer, 280 with soil treatment, 290 with the spray+glycol, 300 with the spray without spreader, 330 with the spray+lauryl alcohol and 380 with the spray+oleic alcohol. The fruit ripened earlier in sprayed than in soil-treated plots and this effect was intensified where oleic alcohol was used as a spreader.

1518. Woolley, J. T.
Sodium and silicon as nutrients for the tomato plant.
Plant Physiol., 1957, **32**: 317-21, bibl. 9.

Tomato plants grown in culture solution increased 12% in dry weight when sodium chloride was present at 1 millimole per l., but did not respond to 3 microgram atoms per l. of either Si or Al. Where neither of these elements was added to the solution, the dried shoot contained 0·09 and 0·15 microgram atoms of Na and Si respectively per g.—Univ. Calif., Berkeley.

1519. Leh, H.-O.
Über die Wirkung von Penicillin auf das Wachstum von Tomaten. **(The action of penicillin on the growth of tomatoes.)**
Z. PflErnähr. Düng., 1957, **78**: 52-4, bibl. 10. bibl. 10.

Applications of a 100 p.p.m. aqueous solution of Penicillin G (crystallized Na salt) to the foliage of tomato plants grown in compost increased the fresh weight of the green parts by 150% and the dry weight by 144% over that of the controls. Increases in shoot length were not significant.—Tech. Univ. Berlin.

1520. Taylor, G. A., and Smith, C. B.
The use of plant analysis in the study of blossom-end rot of tomato.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 341-9, bibl. 15.

Two sand culture studies conducted in the greenhouse revealed a significant increase in the incidence of blossom-end rot at high N levels. A low and high B level failed to have a significant effect on the incidence of this disorder. Plant analysis revealed that plants susceptible to blossom-end rot were significantly lower in Ca and higher in total N, Fe and Cu. Calcium analysis of fruit showed good agreement with the critical value of 0·20% proposed by Raleigh and Chucka [*H.A.*, 15: 728]. Analysis of basal and terminal leaves suggested that terminal leaf samples would provide a more sensitive index of the Ca status of the tomato than would either basal leaves or fruit. A possible explanation for the appearance of typical symptoms of the disorder at the apex of the tomato, based on distribution of Ca within the fruit, is proposed and is accompanied by preliminary evidence. [Authors' summary.]—Pa St. Univ., Univ. Park.

1521. Taylor, G. A.
The influence of some environmental and nutritional factors on the incidence of internal-browning of tomato.
Diss. Abstr., 1957, **17**: 211-12, being *Publ.* 19,326 of 90 pp.

In 3 greenhouse experiments, using soil and sand cultures, 1·2% of the fruits on plants receiving infrequent watering showed internal browning, while with heavy watering plus mist 24·2% of the fruits showed internal browning. Plants producing a high percentage of internally-browned fruits had an average B content of 37 mg./g. dry weight as compared with 93 mg. where internal browning was negligible. In an experiment with high and low B and N levels, the incidence of internal browning was confined almost entirely to low N plots. In low N, low B plots the incidence of internal browning was 22%, while in low N, high B plots 5·5% of the fruits showed internal browning. Analysis of leaf and fruit samples indicated that translocation of reducing sugars was related to both B and N nutrition. High N plants produced an average of over 60% fruits affected with blossom-end rot, when the incidence in fruits from low N plots was 5%. Leaf analysis strongly indicated that Ca deficiency resulting from high N was a basic cause of blossom-end rot.

1522. Wharton, D. C.
Tomato mineral metabolism and respiration as affected by two strains of tobacco mosaic virus.
Diss. Abstr., 1957, **17**: 222-3, being *Publ.* 19,330 of 58 pp.

Tomato plants were inoculated with 2 strains of tobacco mosaic virus. The rate of O_2 uptake by discs from top leaves of infected plants increased in comparison with that of non-infected plants, beginning about 4 days after inoculation of the lowest leaf. The increase continued to a maximum at about the tenth day and then decreased. Calcium and Zn contents were found to decrease in the tops of all infected plants. A significant increase in Mn was found in tomato plant tops infected with the yellow strain of the virus.—Pa St. Univ.

1523. McCallan, S. E. A.
Effectiveness of various formulations of Bordeaux mixture in controlling early and late blights of tomato in greenhouse tests.
Contr. Boyce Thompson Inst., 1957, **19**: 157-67, bibl. 10.

Tomato plants were sprayed with undiluted volumes of each formulation of bordeaux mixture to give deposits of 0·32 and 1·60 mg. copper per 100 cm.^{2} of leaf surface. Freshly prepared and 24-hour aged 10–10–100 formulations without a rain test did not differ significantly in the control of both diseases. However, following the rain test the aged 10–10–100 formulation gave markedly lower control. An aged 10–4–100 formulation maintained a control equivalent to the fresh preparation or to the fresh 10–10–100 formulation both before and after the rain tests. In a series of comparative tests, the 10–3·2–100 formulation was more effective than 10–4–100 when applied fresh or aged both before and after exposure to rainfall. The requisite properties of 10–10–100 bordeaux as a foliage protectant were prolonged for at least 3 weeks at 30° C. by addition of 0·025% Triton X-114 and 2% Maracarb NC. This preparation gave control of both diseases, before and after rain tests, equivalent to that of the freshly prepared 10–10–100 formulation with or without these additives. While there is a tendency for all the bordeaux formulations when applied at the higher level of deposit to give a very mild form of necrotic flecking on the tomato leaves, there was no evidence that the 10–3·2–100 or 10–4–100 formulations caused any more flecking than the standard 10–10–100 formulation. [From author's summary.]

1524. Knight, D. E., and Keyworth, W. G.
Didymella stem rot. Trials with fungicides on outdoor tomatoes.
Comm. Gr, 1958, No. 3239, pp. 231-3, illus.
Maneb and captan promise best results.
Grower, 1958, **49**: 298-9, illus.

A progress report is given on 4 years' trials on fungicidal control of didymella. Spray applications of maneb and zineb to leaf scars on stem bases gave effective protection and eradication up to 7 days after infection, but concentrations required were high (1–2%). Maneb was the most effective fungicide in soil and stem base tests, and captan showed considerable promise as a protectant, but was unsatisfactory as an eradicant. Ethyl mercury phosphate, which was a good eradicant, was not effective as a protectant. Captan was more effective than thiram in a protectant trial, and the best results were obtained with post-planting treatments at 0·5%. Definite recommendations cannot yet be given, but a combined treatment is suggested of maneb to the infection centre and captan more generally.—Nat. Veg. Res. Stat., Wellesbourne.

1525. Tilgate Research Station.
The effect of certain fungicides on transpiration rates and crop yields.
Tech. Bull. Tilgate Res. Stat. **6**, 1957, pp. 6, bibl. 6.

In experiments with tomatoes and potatoes copper sprays increased transpiration, a thiocarbamate (ziram) spray slightly reduced it and phenyl mercury chloride reduced it still more. On tomatoes a mixture of copper and mercury reduced water loss to the same extent as mercury alone, while on potatoes the mixture was the more effective. The possibility is discussed of using mercury sprays to increase yields by reducing transpiration in areas where water is scarce.

1526. Čavčanidze, T. M., and Othmezuri, L. T.
Tomato russet mite *(Vasates lycopersici)* and results of experiments on its chemical control. [Russian.]
Soobšč. AN GruzSSR, 1956, **17**(1): 53-9, from *Ref. Ž.* (*Biol.*), 1957, No. 13, Abstr. 56,333.

In Georgia sulphur caused no higher than 90–94% mortality of the mite. A 0·2% emulsion of metaphos gave 100% mortality but after 3–4 days began to lose its residual action, whereas ISO at 1 : 50 and 1 : 60 concentrations remained fully effective for 10–12 days.

1527. López Cristóbal, U.
La mosca blanca de los invernaculos se difunde en la zona de huertas y jardines. *Trialeurodes vaporariorum* (Westw.) y su toxicogenia en la tomatera. **(Greenhouse white fly is spreading in the market garden area. *Trialeurodes vaporariorum* and its toxic effects on tomato plants.)**
Rev. Fac. Agron. La Plata, 1956, **32**: 213-16, illus.

The pest is resistant to chlorinated insecticides, but can be controlled by adding either 200 g. of 40%-active nicotine sulphate or 250 g. of 50% wettable DDT to each 100 l. of bordeaux fungicidal spray. Nicotine acts more rapidly than DDT. The spray may not reach pupae on the backs of withered and damaged leaves, which should be collected and burned.

1528. Stombler, V., Pelekassis, C. D., and Doyle, D. S.
***Drosophila* control on harvested tomatoes for processing in California 1956.**
J. econ. Ent., 1957, **50**: 476-80, bibl. 7.

In commercial trials a pyrethrum dust containing 0·11% pyrethrins applied to boxes of stacked tomatoes in the field or pallets of tomatoes at the receiving station or at the cannery afforded excellent protection from egg deposition by *Drosophila* for a period of approximately 24 hours. After this the protection afforded rapidly declined. When applied to pallets of tomatoes the pyrethrum dust was much more effective than either pyrethrum mist or smoke or DDT smoke. The pyrethrum dust did not appear to create a residue or an off-flavour problem.

1529. Burns, E. E., and Desrosier, N. W.
Maturation changes in tomato fruits induced by ionizing radiations.
Food Tech., 1957, **11**: 313-16, from *Food Sci. Abstr.*, 1957, Vol. **29**, No. 1941.

The rate of respiration of mature-green tomatoes exposed to γ-irradiation, at dosages of $0 \cdot 5$, $1 \cdot 0$ and $1 \cdot 5 \times 10^6$ rep, showed a sharp increase proportional to the dose. After about 96 hours the rate of respiration decreased and became similar to that of controls. Development of red colour was somewhat inhibited by irradiation (although $1 \cdot 5 \times 10^6$ rep caused a temporary increase); less phytofluene, γ-carotene and lycopene were formed, but the content of β-carotene was not affected and increased normally as maturation proceeded.

1530. Workman, M., and Pratt, H. K.
Studies on the physiology of tomato fruits. II. Ethylene production at 20° C. as related to respiration, ripening, and date of harvest.
Plant Physiol., 1957, **32**: 330-4, bibl. 18.

Production of ethylene in measurable quantities [by tomatoes] began with the first appearance of color and at about the onset of the climacteric rise in respiration. A definite relationship between the maximum rates of ethylene evolution and of carbon dioxide production was not observed. Many fruits show a peak of ethylene production, but tomatoes appear to produce the most ethylene near the end of the storage life. The total amount of ethylene produced by tomatoes during ripening is very small compared to other fruits, and their ethylene/carbon dioxide ratio is consequently one of the lowest. No consistent seasonal changes in the pattern or magnitude of ethylene production were observed; hence, it appears that the failure of mature-green tomatoes to ripen properly late in the season is not related to their loss of ability to produce ethylene. [From authors' summary. For part I see *H.A.*, 27: 3582.]—Univ. Calif., Davis.

1531. Andreotti, R., and Ceci, D.
Indagini sul metabolismo glucidico e sulle variazioni di acidità nel processo di maturazione del pomodoro. (**Investigations on carbohydrate metabolism and on changes in acidity during the process of ripening of the tomato.**) [English summary.]
Ind. Cons., 1955, **30**: 249-53, from *Food Sci. Abstr.*, 1957, Vol. **29**, No. 1942.

The contents of total and reducing sugars in tomato fruits (variety Ladino di Panocchia) were each found to increase from about 15 to 40% (dry weight basis) during ripening. The total acid content (calculated as citric acid) also tended to increase. The starch content gradually decreased, and finally completely disappeared. Glucose and fructose were detected chromatographically, and also glucuronic acid and small amounts of pentoses (xylose and ribose) in the hydrolysates. In tomato leaves reducing sugars decreased, and total sugars and starch increased correspondingly. Glucose, fructose and sucrose were detected chromatographically, and also glucuronic acid and pentoses (xylose, arabinose and ribose), in the hydrolysates.

1532, Andreotti, R.
Indagini sul metabolismo dell'azoto e sulle variazioni del contenuto in sostanze minerali nel processo di maturazione del pomodoro. (**Investigations on nitrogen metabolism and on changes in the content of mineral substances during the process of ripening of the tomato.**) [English summary.]
Ind. Cons., 1956, **31**: 305-8, from *Food Sci. Abstr.*, 1957, Vol. **29**, No. 1943.

In tomatoes of the Ladino de Panocchia variety the percentage of total N, on a fresh weight basis, generally decreased during ripening; values were maximum during the earlier stages of development, and minimum when the tomatoes became yellow-red. On a dry weight basis, however, the percentage of total N showed a slight increase; the increase was more marked when values were expressed in g. per fruit. The contents of soluble N and amino N were rather similar, and increased during development of the fruit; the increase was greater when values were calculated as percentages on a dry weight basis, or were expressed in g per fruit, than when calculated on a fresh weight basis. The protein N content showed a decrease, whether calculated on a fresh weight or dry weight basis, but a slight increase when values were expressed in g per fruit. Mineral content, calculated as a percentage on either a fresh weight or dry weight basis, decreased slightly at first, but increased towards the end of the ripening process; when expressed in g. per fruit, however, it showed a progressive increase. Changes in alkalinity of the ash were very similar to changes in mineral content.

1533. Marh, A. T., and Fel'dman, A. L.
Dehydrogenases of tomatoes. [Russian, with English summary 8 lines.]
Biohimija, 1957, **22**: 929-32, bibl. 9.

In tomato fruits dehydrogenases of malic, succinic, formic and lactic acids, ethylalcohol and glucose were found. During ripening the decrease in enzyme activity was associated with the decline in respiration rate.

1534. Kattan, A. A.
Changes in color and firmness during ripening of detached tomatoes, and the use of a new instrument for measuring firmness.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 379-84, bibl. 6, illus.

Tomatoes harvested at the pink stage attained maximum colour after 6 days and were considerably firmer at this stage than tomatoes harvested at inception or mature green stages when these had attained maximum colour after 10 days' ripening. An instrument, the firm-o-meter, was developed to measure firmness of tomatoes by determining the resistance of a fruit to constriction. Readings obtained by the firm-o-meter were highly correlated with those obtained by the Cornell Pressure Tester [see *H.A.*, 23: 3196 l], and the new instrument has the advantage of exerting pressure all round the fruit instead of at one specific point.—Univ. Ark., Fayetteville.

1535. Smith, P. G., and Heiser, C. B., Jr.
Taxonomy of *Capsicum sinense* Jacq. and the geographic distribution of the cultivated *Capsicum* species.
Bull. Torrey bot. Cl., 1957, **84**: 413-20, bibl. 7, illus.

A previously unrecognized cultivated pepper, *Capsicum sinense* Jacq., is reported from Central amd South America. This species is most readily distinguished by the 3–5 flowers at each node, the declinate pedicels, and the circular constriction at the base of the calyx in fruit. Crosses between *C. sinense* and both *C. annuum* and *C. frutescens*, to which it appears most closely related, generally give hybrids showing some impairment of fertility. Notes on the geographical distribution of the other cultivated peppers, *C. annuum*, *C. frutescens*, *C. pendulum*, and *C. pubescens*, are also presented. [Authors' summary.]—Univ. Calif., Davis, and Indiana Univ., Bloomington.

1536. Benedek, L.
A fűszerpaprika festéktartalmának meghatározása. **(Determination of pigment contents in red pepper.)** [Russian and English summaries 1 p. each.]
Növénytermelés, 1957, **6**: 145-54, bibl. 8, illus.

A simple and rapid test method based on photometry is described by which all pigments can be measured simultaneously.—Inst. exp. Agric., Szeged.

1537. LeCompte, S. B., Jr.
Studies measure effects of irrigation on pepper yields.
N.J. Agric., 1957, **39**(5): 10-12.

Comparisons on growth and yields were made over 4 seasons between irrigated and non-irrigated plots of 5 varieties of capsicum. Early marketable yields of Rutgers World Beater 13 ranged from about 11,000 lb. per acre under irrigation to about 1,200 lb. per acre without irrigation. Market quality of peppers was improved by irrigation.

1538. Muntañola, M.
Parásitos criptogámicos de los pimientos y ajíes (*Capsicum* spp.) en la provincia de Tucumán. **(Fungus and bacterial diseases of red peppers and chillies *(Capsicum* spp.) in Tucumán province.)** [English summary ¾ p.]
Rev. agron. Noroeste argent., 1957, **2**: 295-344, bibl. 88, illus.

The various pathogens are described. Control measures are discussed in general. Bordeaux mixture has given good results against foliar pathogens. Irregular watering and consequent cracking of fruits greatly increases infection. *Fusarium vasinfectum* has been checked by planting in irrigation furrows at least 1·2 m. apart and gradually ridging up the plants.

1539. Anon.
El cultivo de pimentones en invierno. **(Growing capsicums in winter.)**
Not. agric. Serv. Shell Agric. Venezuela, 1957, No. 20, 2½ pp. (unnumbered), illus.

Advice to Venezuelan capsicum growers on control of damping off (*Pythium*, *Rhizoctonia* and *Fusarium* spp.) by fungicidal treatment of seeds and seedbeds, and control of leaf spot (*Cercospora capsici*) and collar rot (*Phytophthora capsici*) in the field by captan.

1540. Takeda, A., and Senda, J.
Induction of parthenocarpy with N-arylglycines.
Ber. Ohara Inst. landw. Biol., 1957, **11**: 75-7, bibl. 3.

Eggplants produced parthenocarpic fruits when their flower buds were treated with N-(2,4-dichlorophenyl)-glycine, sets of 50% or more being obtained with a 2% concentration. N-(3-chlorophenyl)-glycine, N-(2,4-dichlorophenyl)glycinonitrile and N-(3,4-dichlorophenyl)glycinonitrile were not effective.

J.R.L.

1541. Rao, P. V. R., and Narayana, K. L.
Control of the brinjal fruit borer, *Leucinodes orbonalis* G. in South India.
South Indian Hort., 1957, **5**: 100-5, bibl. 12.

The caterpillars of this moth do widespread damage to the shoots and fruits of eggplants in India and elsewhere. In spraying experiments in 2 seasons endrin at 0·03% and ryania at 0·625% gave significantly greater reductions in incidence than diazinon at 0·03% or malathion at 0·0625%.

Sundry Crops.

(*See also* 1545e, 1546r.)

1542. Chaugule, B. A., and Khot, B. D.
Four years with *suran*.
Indian Fmg, 1957, 7(9): 27-31, illus.

Amorphophallus campanulatus, the elephant foot yam, needs 4 annual replantings to reach marketable size but then yields 18 tons/acre. Details of the operations and cost of production are given.

1543. Twigg, B. A., Stark, F. C., and Kramer, A.
Cultural studies with matai (Chinese water chestnut).
Proc. Amer. Soc. hort. Sci., 1957, **70**: 266-72, bibl. 10, illus.

Two experiments with various cultural treatments were conducted to determine the feasibility of growing matai (*Eleocharis dulcis*) commercially in Maryland and Virginia. Water level appeared to be the most critical of the factors studied. Low water level (soil soaked daily) depressed development of secondary plants and resulted in very low yields. Yields increased with increase in water level, being highest when the soil was flooded to a depth of 3–4 inches. There were no differences due to fertility, N or P levels or to pH. At a high water level propagation by transplants resulted in a higher yield in a shorter time than propagation by corms. It is concluded that matai yields of 10–15 tons per acre are possible in this region if an adequate water supply is available. Harvesting, however, proved to be a time-consuming and expensive operation.—Univ. Md, College Park.

1544. Yang, T. H., and others.
Studies on the soluble sugars, amino acids, and organic bases in the Taiwan water-chestnut. [Chinese summary 5 lines.]
J. agric. Ass. China, 1957, No. 18, pp. 67-9, bibl. 4.

From the results of paper chromatographic and other tests it is considered that the alcohol or water extracted solutions and the juice of crushed Taiwan water chestnuts (corms of *Eleocharis plantaginea*) contain glucose, fructose, aspartic acid, arginine, α-alanine, glutamic acid, histidine, leucine, methionine, adenine and choline. Cystine and tyrosine appeared to be in the supernatant portion of the extracts and the residual portion contained starch granules.—Coll. Agric., Nat. Taiwan Univ. J.R.L.

Noted.

1545.

a AIDA, H., AND UEHARA, T.
Ecological studies on vegetables in a warm region (Miura Peninsula). No. 1. Response of Okuzure peas to low temperature. [Japanese, with English summary ¼ p.]
Bull. Kanagawa agric. Exp. Stat. hort. Sect., 1957, No. 5, pp. 43-8, bibl. 12, illus.
Seed vernalization adversely affected growth.

b ANDEWEG, J. M., AND VAN KOOTEN, A.
The practical importance of an identification of garden pea varieties in the seedling stage.
Euphytica, 1957, **6**: 237-41, bibl. 4, illus.

c ANON.
Wooden trays for tomatoes.
Agriculture, Lond., 1958, **64**: 523-4.
A new British Standard version B.S.2892, measuring 15⅛ × 11⅝ × 3 ins., recommended for more economical stacking.

d BURKHEAD, C. E., KIRKBRIDE, J. W., AND GURTZ, R. F.
Dry beans and dry peas. Acreage, yield, production-total and by classes, price and value by states, 1909-53.
Statist. Bull. U.S. Dep. Agric. **213**, 1957, pp. 45.

e CHATTOPADHYAY, S. B., AND BASU, P. K.
Wilt of bhendi *(Abelmoschus esculentus)*.
Sci. and Cult., 1957, **23**: 320-1.
To prevent attack by *Fusarium* sp. okra should be grown on light soil.

f CROP REPORTING BOARD, U.S. DEPARTMENT OF AGRICULTURE.
Vegetables for fresh market. Acreage, production, and value, 1949-55.
Statist. Bull. U.S. Dep. Agric. **212**, 1957, pp. 150.
Revised estimates for vegetables, melons, mint for oil and strawberries.

g CROWLEY, N. C.
The effect of developing embryos on plant viruses.
Aust. J. biol. Sci., 1957, **10**: 443-8, bibl. 6.
Studies on the seed transmission of plant virus diseases.
Aust. J. biol. Sci., 1957, **10**: 449-64, bibl. 73.
No evidence of any virus-inactivating activity in the embryos of tomato, bean or capsicum.

h EDGINGTON, L. V., AND WALKER, J. C.
Influence of soil and air temperature on *Verticillium* wilt of tomato.
Phytopathology, 1957, **47**: 594-8, bibl. 10.
For shorter version see *H.A.*, 27: 2544.

i ENSLIN, P. R., REHM, S., AND OTHERS.
Bitter principles of the Cucurbitaceae. VI. The isolation and characterization of six new crystalline bitter principles. VII. The distribution of bitter principles in this plant family. VIII. Cucurbitacins in seedlings—occurrence, biochemistry and genetical aspects.
J. Sci. Food Agric., 1957, **8**: 673-8, bibl. 20, 679-86, bibl. 7, and 687-91, bibl. 6.
Studies covering many wild and cultivated species.

j EVENARI, M., AND OTHERS.
The beginning of cell division and cell elongation in germinating lettuce seed.
Bull. Res. Coun. Israel, Sect. D, 1957, **6**: 33-7, bibl. 8.
The start of mitoses, the beginning of cell elongation and the protrusion of the rootlet are correlated events during germination.

k FRIEND, W. G., AND HARCOURT, D. G.
Influence of three types of soil on damage caused by the cabbage maggot, *Hylemya brassicae* (Bouché).
Rep. Que. Soc. Prot. Plants, 1956, 1957, **38**: 36-9, bibl. 8.
In two years' observations, damage was worse and populations were greater on the lightest soil.

l GHISLENI, P. L., AND QUAGLIOTTI, L.
Una prova di confronto fra cultivar di melanzana (*Solanum melongena* L.) diffuse in Italia. **(Comparative trials of varieties of eggplant *(Solanum melongena)* grown in Italy.)**
Riv. Ortoflorofruttic. ital., 1957, **41**: 619-24, bibl. 30.

m GROSZMANN, H. M.
Pulse crops (beans and peas).
Adv. Leafl. Div. Plant Ind., Dep. Agric. Qd **245**, revised 1956, pp. 16, illus.
Cultivation and varieties [for first edition see *H.A.*, 22: 3821].

n IACOPINI, P.
Alcuni aspetti della lotta contro il *Ceuthorrhynchus pleurostigma* Marsh. **(Some aspects of the control of *(Ceuthorrhynchus pleurostigma.)*** [English summary 5 lines.]
Riv. Ortoflorofruttic. ital., 1957, **41**: 625-31, bibl. 18, illus.
Superphosphate 18/20 containing aldrin reduced infestation of cauliflowers, compared with standard superphosphate.

o JOHNSEN, J. K., AND MYRSTAD, A.
Sortsforsøk med veksthustomat 1957. **(Variety trials with glasshouse tomatoes 1957.)**
Sortsforsøk med veksthustomat 1955-1957. **(Variety trials with glasshouse tomatoes 1955-57.)**
Gartneryrket, 1957, **47**: 934-5 and 1958, **48**: 25-7.
Carried out in several localities by the Agricultural College of Norway. [See also *H.A.*, 27: 2557i.]

p JONES, H. A., PERRY, B. A., AND DAVIS, G. N.
Growing the transplant onion crop.
Fmrs' Bull. U.S. Dep. Agric. **1956**, revised 1957, pp. 27, illus.
For earlier edition see *H.A.*, 20: 1666.

q KENTEN, R. H.
Latent phenolase in extracts of broad-bean *(Vicia faba* L.) leaves. 1. Activation by acid and alkali.
Biochem. J., 1957, **67**: 300-7, bibl. 23.

r KORMOS, J., AND KORMOS, J.
A puha paprika. **(Soft green pepper.)** [English, Russian and German summaries ¾ p. each.]
Növénytermelés, 1957, **6**: 33-44, bibl. 6.
Suitable for canning. [See also *H.A.*, 27: 519.]

s DE LEON, R. G.
Test of fungicides for the control of tomato leaf mold.
Philipp. Agric., 1957, **41**: 268-72, bibl. 4.
Cladosporium fulvum was controlled by 6 weekly sprayings of Zerlate or Dithane Z-78, both at 2 lb. per 100 gal. water.

t LUZ, N. K.
Ensaios de tratamento de sementes de ervilha com fungicidas. **(Trials on fungicidal treatment of pea seed.)** [English summary 4 lines.]
Reprinted from *Agron. sulriograndense*, [undated], **2**(1): 16-18, bibl. 4.
In 2 years' trials treatment of pea seed with Arasan, Spergon, Semesan, Phygon, Serfolex or Fermate had no significant effect on emergence or yield.

u MINISTRY OF AGRICULTURE, LONDON.
Pea root eelworm.
Adv. Leafl. Minist. Agric. Lond. **462**, 1957, pp. 4, illus.
Heterodera göttingiana.

v PAQUIN, R.
Effet de la lycomarasmine et de l'acide fusarique sur l'activité enzimatique des mitochondries de la tomate. **(The effect of lycomarasmine and fusaric acid on the enzyme activity of tomato mitochondria.)**
Rep. Que. Soc. Prot. Plants, 1956, 1957, **38**: 101.
A short note on the inhibiting effect of two toxic products of *Fusarium oxysporum* f. *lycopersici.*

w POLUNIN, JA. JA.
The vegetative hybrid pea Urožajnyj 51. [Russian.]
Agrobiologija, 1957, No. 3, pp. 99-104, illus.
A canning variety, suitable for machine threshing; obtained from Štambovyj mozgovoj grafted on Lord Robert.

x QUEENSLAND DEPARTMENT OF AGRICULTURE.
Cucumbers, rockmelons and related crops.
Adv. Leafl. Qd Dep. Agric., Div. Plant Indust. **199**, revised 1956, pp. 14, illus.
For first edition see *H.A.*, 21: 1632.

y QUINONES, F. A.
Heterosis in tomatoes as affected by diverse origin of parents.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 366-72, bibl. 6.

z RAMBELLI, A.
La fusariosi dei bulbi d'aglio. ***(Fusarium* rot of garlic bulbs.)**
Inf. fitopat., 1957, **7**: 366-7, illus.
Infection by *Fusarium oxysporum* is increased by high soil temperature (28-30° C.). Bulbs should be stored at R.H. about 65% and temperature 0° C. or slightly higher.

1546.

a RENIS, H. E.
Studies on sulfur compounds from onion.
Diss. Abstr., 1957, **17**: 1456-7, being *Publ.* 21,309 of 130 pp.

b REYNOLDS, J. D.
Some developments in threshed-pea growing.
Agric. Rev. Lond., 1958, **3**(8): 22-6, bibl. 32.

c RICHARDSON, R. W., JR., AND ALVAREZ L., E.
Cruzamiento natural en el jitomate. **(Natural cross-pollination of tomatoes.)**
Agric. tec. México, Winter 1956-57, No. 3, pp. 18, 44-5, illus.
See *H.A.*, 27: 3605e.

d RIMON, D.
Lipase activity of germinating lettuce seeds.
Bull. Res. Coun. Israel, Sect. D, 1957, **6**: 53-5, bibl. 4.
A neutral and an acid lipase have been found to develop during germination.—Hebrew Univ., Jerusalem.

e RODNIKOV, N. P.
Work of the faculty of vegetable growing and vegetable experimental station of the Timiryazev Agricultural Academy. [Russian, with English summary 4 lines.]
Izv. Timiryazev. seljsk. Akad., 1957, No. 4, pp. 131-42, illus.

f SELMAN, I. W., AND PEGG, G. F.
An analysis of the growth response of young tomato plants to infection by *Verticillium albo-atrum.*
Ann. appl. Biol., 1957, **45**: 674-81, bibl. 6.
The data accord with a toxin theory of damage and suggest that young plants have a greater tolerance to the toxin than older plants.

g SILBERSCHMIDT, K.
Uma doença do tomateiro em Piedade, causada pelo virus Y da batatinha. **(A tomato disease in Piedade caused by potato virus Y.)** [English summary 2 pp.]
Arq. Inst. biol. S. Paulo, 1956, **23**: 125-50, bibl. 21, illus.

h Silberschmidt, K. M.
Cross-protection ("premunity") tests with two strains of potato virus Y in tomatoes. [Spanish summary 11 lines.]
Turrialba, 1957, **7**: 34-43, bibl. 26, illus.

i Sinjuhin, A. M.
The physiological processes occurring in the callus tissue of the tomato plant during the formation of secondary meristem. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1957, **117**: 511-14, bibl. 16.

j Smith, W. H.
Refrigeration for watercress.
Misc. Paper D.S.I.R. Food Invest. **16/57**, 1957, p. 1.
Hydrocooling before packing in a polythene bag improved the condition of watercress at the market.—Ditton Lab.

k Sneep, J.
Geschiedenis van de spinazie en het ontstaan van de rassen. **(The history of spinach and the origin of varieties.)**
Meded. Inst. Vered. Tuinbouwgew. **112**, 1957, pp. 30, bibl. 91.

l Spurr, A. R.
The effect of boron on cell-wall structure in celery.
Amer. J. Bot., 1957, **44**: 637-50, bibl. 76, illus.
For a shorter version see *H.A.*, 27: 3453.

m Stelmach, Z.
Bromine retention in soils and uptake of bromine by plants after soil fumigation.
Diss. Abstr., 1957, **17**: 1637-8, being *Publ.* 21,388 of 99 pp.
Tests plants included bean, beetroot and cabbage.

n Thévenin, L.
L'évolution de la culture de la tomate en Tunisie. **(The development of tomato growing in Tunisia.)**
C.R. Acad. Agric. Fr., 1957, **43**: 657-63.
Causes of decline discussed; suitable varieties listed [see also *H.A.*, 27: 513].

o Troníčková-Poláková, E.
Využití heterosis u rajčat. **(The use of hybrid vigour in tomatoes.)** [Russian and German summaries 1 p. each.]
Věd. Práce výzk. Úst. rostl. Výroby ČSAZV, 1957, No. 3, pp. 127-56, bibl. 23, illus.
Experience with hybrid tomato varieties is presented and discussed. Four recommended crosses for raising seed are given.

p Van Gundy, S. D., and Walker, J. C.
Relation of temperature and host nutrition to angular leaf spot of cucumber.
Phytopathology, 1957, **47**: 615-19, bibl. 17.
For shorter version see *H.A.*, 27: 2421.

q Venkataratnam, L.
Tomatillo or the Mexican husk tomato.
Mysore agric. J., 1957, **32**: 86-8, bibl. 3, illus.
Notes on *Physalis ixocarpa* and its culture.

r Venketram, T. M., and Lakshmanan, V.
Sponge gourds should rightly be more popular.
Indian Fmg, 1957, **7**(9): 25-6, illus.
Luffa cylindrica as a domestic vegetable crop.

s Viado, G. B., Banaag, A. F., and Moresto, S. E.
Some organic insecticides in the control of cabbage worm.
Philipp. Agric., 1957, **41**: 261-7, bibl. 12.
Diazinon 20% e.c., 1 pint per 100 gal. water sprayed weekly, gave complete control of *Pieris canidia.*

t Vidvei, E.
Sortsforsøk i broccoli 1956 og 1957. **(Broccoli variety trials 1956 and 1957.)**
Gartneryrket, 1958, **48**: 8-10, 12, illus.
At the Institute of Vegetable Culture, Agricultural College, Norway.

u Vittum, M. T.
Tomato defoliation.
Amer. Veg. Gr, 1957, **5**(10): 20-1.
The pros and cons of late season defoliation.

v Wishart, R. L.
Growing gherkins and cucumbers for factory use.
J. Dep. Agric. S. Aust., 1957, **61**: 240-4, illus.
Cultural details.

w Zanardi, D.
Prove di lotta con zineb contro la *Peronospora schleideni* Ung. della cipolla (*Allium cepa* L.). **(Tests with zineb for control of *Peronospora schleideni* in onions.)** [English summary 6 lines.]
Not. Mal. Piante, 1957, No. 42, pp. 43-50, bibl. 2, illus.
Zineb at 0·3% was greatly superior to 1% bordeaux mixture.

TOBACCO.

General and varieties.

(*See also* 1052, 1347-1349, 1602b, g, o-r, 2041.)

1547. Steinberg, R. A.
Some growth requirements in the genus *Nicotiana*.
Tobacco, N.Y., 1957, **145**(1): 20-3, bibl. 3, illus.

Problems of maintaining a collection of *Nicotiana* species are discussed, and the method adopted at Beltsville, Maryland, for encouraging flowering and seed production are outlined. The date of, and height at, flowering of 53 species are tabulated, both for plants grown in the open and also for March- and September-sown plants grown in a glasshouse kept at 75°–80° F. day and night.—Agric. Res. Serv., U.S.D.A.

1548. Baird, E. W.
Tobacco growing in the Marceba-Dimbulah area.
Qd agric. J., 1955, **81**: 255-67, 311-20; 1956, **82**: 3-13, illus., reprinted as *Adv. Leafl. Qd Dep. Agric. Stk, Div. Plant Ind.* **404**, 1956, pp. 34.

After describing the climate and soils of this area of north Queensland, the author details the best methods of raising seedlings, and of growing, harvesting and curing the crop.

1549. Renier, A., and Mounat, A.
Comparaison de variétés de tabac Paraguay de diverses origines. Essais 1953–1954–1955. **(Comparison of Paraguay tobacco varieties of different origins. Trials of 1953, '54, '55.)** [English summary 5 lines.]
Ann. Inst. exp. Tabac Bergerac, 1957, **2**(4): 71-83.

In trials conducted in S.W. France the variety Périgueux 48 (1948 selection) was outstanding. The variety Cajarc × GO 81 had the lowest nicotine content. [For descriptions of the varieties see *H.A.*, 27: 3608.]

1550. Bliss, L. C., Kramer, P. J., and Wolf, F. A.
Drought resistance in tobacco.
Tobacco, N.Y., 1957, **145**(8): 20-3, bibl. 4.

Observations made in Kentucky suggested that dark tobaccos are more drought resistant than burley tobaccos. In an attempt to determine the factors responsible for the difference, detailed anatomical and physiological comparisons were made between the dark variety Madole and the burley variety Kentucky 16. However, such anatomical and physiological differences as were found appear to be too small to account for the difference in drought resistance. The most likely explanation of the difference in drought reaction is that burley plants are spaced much more closely, and present a larger transpiring surface per acre, than dark plants.—Univ. Ill., Urbana, and Duke Univ., Durham, N.C.

1551. Kosmodem'janskij, V. N.
A study of the aromatic properties of different varieties and hybrids of tobacco. [Russian.]
Sb. nauč.-issled. Rabot. Vses. n.-i. In-ta Tabaka i Mahorki, 1956, No. 149, pp. 67-90, from *Ref. Ž.* (*Biol.*), 1957, No. 14, Abstr. 60,754.

This work was carried out in regions suitable (Frunze, Suhumi, Jalta) and unsuitable (Krasnodar) for aromatic tobacco growing. Varieties, which retained their aromatic characteristics even on chernozem soils, included Djubek and Havana and the semi-aromatic varieties American and Maryland. Samsun lost its aroma on unsuitable soils. When crossing aromatic varieties with others aroma was dominant in most cases. When crossing varieties with different types of aroma a "double" aroma was obtained. On the basis of an analysis of a large number of varieties and hybrids 6 types of aroma were recognized, which were linked with variations in chemical composition. In addition to soil, leaf position, topping and time of harvesting affected aroma.

1552. Kadam, B. S., Krishnamoorthi, T., and Awatramani, N. A.
Spangling in bidi tobacco.
Indian Tobacco, 1957, **7**: 157-64, bibl. 6, illus.

Observations made over 3 seasons show that the development of red-brown spots or spangles is partly a varietal characteristic. Heavy manuring, low plant population, and few leaves per plant favour spangle production. Well spangled tobacco fetches higher prices.

Seedbeds.

1553. Lugo-López, M. A., and others.
Effect of soil-structure stabilizers on the production of tobacco plants in the seedbed.
[Spanish summary ½ p.]
J. Agric. Univ. P.R., 1957, **41**: 189-96, bibl. 4, illus.

The materials used in an experiment in 1952–53 were: none, 25 tons to the acre of filter-press cake, and Krilium 6, Krilium 9 and Aerotil, each at the rate of 3,600 lb. to the acre of the dry powdered form. In an experiment in 1953–54 the same stabilizers were used with the addition of Goodrite in both the flake and liquid forms. All stabilizers were applied on the basis of a 0·02% concentration of the active ingredient. The numbers of seedlings obtained from the check plots, filter-press-cake-treated plots, and the Aerotil-treated plots were significantly greater than those obtained from plots treated with both Krilium formulations in the 1952–53 experiment. Significant differences were measured in the 1953–54 experiment favouring both Goodrite formulations as compared with Krilium 6. Filter-presscake seemed effective in inducing a quicker emergence and adequate development of the seedling. [From authors' summary.]

1554. Seay, W. A.
The effect of superphosphate in cyanamid-treated plant beds in preventing ammonia toxicity.
Tobacco, N.Y., 1957, **145**(5): 22-4, bibl. 1, illus.

In preparing land for tobacco seedbeds a soya bean crop was (a) ploughed in, or (b) mowed and removed, in September. The area was then treated with calcium cyanamide at rates of 1½ and 2 lb./sq. yd., to which had been added 3 types of phosphatic fertilizer in various amounts. In some cases the P applications were not made until the spring or were split, part being applied with the cyanamide in September and the remainder when the tobacco was sown in April. The response to superphosphate in terms of number of settable plants produced was excellent, especially where the whole dose was applied in the autumn, there being no difference between plots which received 2, 3 or 4 lb. per sq. yd. By contrast, concentrated superphosphate and calcium metaphosphate had little effect in preventing ammonia injury from the cyanamide, and the ploughing-in of the soya beans also had no effect on the number of plants produced.—Ky. agric. Exp. Stat., Lexington.

Soil management, nutrition and irrigation.

(*See also* 1065.)

1555. Hudson, N. W.
Soil erosion and tobacco growing.
Rhod. agric. J., 1957, **54**: 547-55, bibl. 4, illus.

Tobacco soils are by their nature highly subject to erosion. Data are presented which show that the quantities of soil lost from land under tobacco are apt to be considerably higher than those from comparable land under several other crops. Moreover, in comparing tobacco crops, soil losses are shown to be increased by late planting, by poor stands, and especially by the slope of the land. The amount of erosion in a second tobacco crop is also apt to be greater than that in the preceding tobacco crop. Methods of laying out contour ridges with rows set at an angle to them are described.

1556. de Roo, H. C.
Root growth in Connecticut tobacco soils.
Bull. Conn. agric. Exp. Stat. **608**, 1957, pp. 36, bibl. 43, illus.

This bulletin serves as an indication to detailed studies on soil and cultural factors affecting the growth and distribution of tobacco roots, which are under way at the Tobacco Laboratory, Windsor, Connecticut. Methods of tracing and measuring root systems are discussed, and the needle or pin-board method, which has been adopted for nearly all the studies of soil-root relations, is described in detail. The profile and physical characteristics of the main tobacco soil, a sandy loam, are also described, and examples are given, with illustrations, of root distribution as affected by tillage operations. The studies indicate clearly that root development is restricted both by plough pans and so-called traffic pans, i.e. soil recompaction caused by tractors, disc harrows, etc. Most of this panning can, however, be prevented by planting relatively deep rooted green manure crops between successive tobacco crops, by subsoiling and deep ploughing, and by reducing machine traffic and secondary tillage as much as possible.

1557. Bhat, N. R.
New research findings of interest to flue-cured tobacco growers.
Indian Tobacco, 1957, 7: 183-7.

Investigations at Rajahmundry and Guntur are outlined. In an experiment conducted over 4 seasons 3, 4, 5 and 6 ploughings prior to planting were compared. Results showed that in normal seasons the fewer the ploughings the greater the yield. Preliminary results from other experiments indicated that deep summer ploughing (9 in.) and deep placement of nitrogen both increased yields. Mulching also increased yields in a further trial. The variety Delcrest gave a higher percentage of bright grades than Harrison Special.—Cent. Tob. Res. Inst., Rajahmundry.

1558. Hitier, H., and others.
Comparaison d'engrais azotés complémentaires appliqués au tabac. (**A comparison of supplementary nitrogenous fertilizers applied to tobacco.**) [English summary 12 lines.]
Ann. Inst. exp. Tabac Bergerac, 1957, **2**(4): 27-42, bibl. 2.

In 3 years' experiments on 2 soil types in the Dordogne valley (S.W. France) calcium nitrate, urea-formaldehyde, urea and ammonium sulphate were applied at 2 levels each of N after a heavy general dressing of F.Y.M. plus P and K. The lower level, 47 kg./ha. of N, proved sufficient. Calcium nitrate, urea and ammonium sulphate gave similar results, the first suiting heavier soil and the second the lighter land. Urea formaldehyde was less satisfactory. The heavier dressings lowered quality by increasing nicotine content.

1559. Chouteau, J.
La nutrition azotée du tabac en fonction de la nature des engrais complémentaires. (**Nitrogenous nutrition of tobacco as affected by the nature of supplementary fertilizers.**) [English summary ½ p.]
Ann. Inst. exp. Tabac Bergerac, 1957, **2**(4): 43-63, bibl. 11.

Laboratory and field experiments were conducted in S.W. France. Urea nitrified faster than ammonium sulphate and caused a short rise in pH followed by temporary acidification of the soil. Losses as ammonia were only important when urea was placed on the soil surface. Urea formaldehyde did not effectively supply N to tobacco. In heavy soils N from calcium nitrate was most rapidly absorbed; in lighter soils N as ammonium salts was more effective and less easily leached.

1560. Shaw, L.
The effects of two sources of nitrogen on the yield and quality of burley tobacco in North Carolina.
Tobacco, N.Y., 1957, **145**(14): 22-3, bibl. 4.

Ammonium nitrate and a mixture of ⅔ ammonium nitrate and ⅓ cottonseed meal were compared as sources of N for Kentucky 16 tobacco grown on two research stations in North Carolina in 3 successive years. In the first two years N was applied at 0 and 36 lb. and in the third year at 0 and 72 lb. per acre. P_2O_5 and K_2O were each applied to all plots at 90 lb. per acre. In general, N applications produced significant increases in yields and values per acre, in value per cwt., and in crop and grade indexes, but there were no differences in yield and quality attributable to one or other source of N.—Agric. Res. Serv., U.S.D.A.

1561. Klein, E. K.
Über den Einfluss der Mineralsalzernährung auf den Gehalt des Blattes an freien Aminosäuren und Monosacchariden und seine Bedeutung für die Empfänglichkeit der Pflanze gegenüber parasitären Pilzen. II. Mitt. **(The effect of mineral nutrition on the leaf content of amino acids and monosaccharides and its significance in plant susceptibility to parasitic fungi. Part II.)**
Bayer. Landw. Jb., 1956, **33**: 347-67, from *Abstract Card Inst. Tabakforsch., Dresden*, No. 57/495.

Tobacco plants that received high ammonium-N nutrition had higher leaf contents of glutamic acid and glutamine and were more susceptible to disease than plants that had not received ammonium-N. Increased fungus infection was observed in plants showing symptoms of P deficiency or N and K excess. [Part I was noted in *H.A.*, 27: 2615m.]

1562. Wöber, O., and Peer, P.
Influence des engrais chimiques sur la couleur et la qualité des tabacs de cape italiens pour cigares destinés à l'exportation. **(The effect of chemical fertilizers on colour and quality of Italian Cape tobacco for export cigars.)**
Rev. int. Tabacs, 1957, **32**: 158-60.

On a "Borowina" soil increasing applications of potassium sulphate to shade tobacco resulted in improved quality and induced changes in chemical composition. Contents of Cl and K increased with increasing K applications, but B contents decreased. High doses of K did not improve combustibility.—Österreich. Tabakregie.

1563. Neas, I., and Ingham, S.
Factors affecting tobacco planted before the rains set in.
Rhod. Tobacco, 1957, No. 15, pp. 4–7, illus.

Pre-rain planting is associated with improved yields and quality and with reduced losses. Where irrigation facilities are not available, 2–3 pints of water per plant at the planting site will maintain it for 10–21 days without re-watering. It is unwise to plant before October. Less N is required for tobacco planted before the rains.

1564. Rosser, J.
A layout for contour furrow irrigation of tobacco on a 5 per cent slope in the Mareeba-Dimbulah area.
Qd agric. J., 1957, **83**: 489-98, illus.

A successful method of furrow irrigation used on 5% slopes in Queensland is described in some detail with the aid of diagrams and photographs. The soil was a loamy sand. The aims were even watering, economy in the use of water and the prevention of erosion during irrigation or rainstorms.

1565. (Santaella, J.)
Sobre el riego del tabaco. **(Tobacco irrigation.)**
Mem. Trab. realiz. 1955-56 Inst. nac. Invest. agron., Madrid, 1957, pp. 146-7.

Tobacco was irrigated either 8 times until topped or given 2 extra irrigations after topping. In both cases a total of 4,500 cu.m. of water per ha. was compared with one of 5,500 cu.m. There were no significant differences in yield or burning quality, although in a previous experiment the yield had increased and burning quality deteriorated (possibly because hard water was used) with prolonged irrigation. In a later experiment irrigation was uniform (3 applications) until transplants were established and was then varied until topping, although in each case the total water supplied, including rainfall, was 5,446 cu.m. per ha. Yields were unaffected by the irrigation treatments, but burning quality was highest when no water was given for the first 40 days and 6 irrigations then followed at 8-day intervals. Significantly lower quality resulted when 5 irrigations were given when they appeared necessary, and a further smaller, but significant reduction occurred when 7 irrigations were given at 10-day intervals.

1566. Amarell, H.
Über den Einfluss der zusätzlichen Wasserversorgung und künstlichen Beschattung auf Ertrag, Qualität und chemische Zusammensetzung des Tabaks. **(The effect of irrigation and artificial shading on the yield, quality and chemical composition of tobacco.)** [Russian and English summaries 1 p. and ¾ p. respectively.]
Ber. Inst. Tabakforsch. Dresden, 1957, **4**: 203-46, bibl. 43, illus.

In an attempt to grow good quality wrapper tobacco, irrigation and shading trials were carried out during 3 seasons at Dresden. Results with irrigation were not promising, and it is not recommended for this area. High yields of good quality, thin leaves were obtained from shaded tobacco. Contents of total N, protein N, and K_2O were higher in shade-grown leaves, which also had a smaller Ca/K_2O ratio. Increasing K_2O fertilization resulted in increasing K_2O contents in non-shaded leaves, but not in shaded leaves. Chlorine was absorbed to a lesser extent by shaded than by unshaded plants. Irrigated plants had lower contents of total N, protein N and CaO, but higher K_2O and Cl contents than non-irrigated plants.

Topping and desuckering.

1567. Sajnani, B. T.
Influence of topping and spacing on yield and quality of hookah and chewing tobacco *(N. tabacum)* in North Bihar.
Indian Tobacco, 1957, **7**: 165-76, bibl. 6.

In North Bihar tobacco is topped at 8–10 leaves and spaced at 36 in. × 36 in. In an experiment, conducted over 4 seasons, 14-leaf topping increased the yield by 28·8% over 8-leaf topping, and 24 in. × 36 in. spacing increased the yield by 31% over 36 in. × 36 in. spacing. Leaf size was somewhat reduced by close spacing but increased by high topping. Combined close spacing and high topping more than doubled the yield with very little loss of quality.—Hookah and Chewing Tob. Res. Stat., Pusa.

1568. Tibbitts, T. W., and Wedin, N.
Quality of tobacco harvested from plants treated with maleic hydrazide.
Tobacco, N.Y., 1957, **145**(13): 22-4, bibl. 10.

Plants of a cigar-type tobacco, Havana 307, were sprayed immediately after topping with MH at 0, 1·23, 2·25 and 3·38 lb. per acre. Each increase in rate of MH resulted in a significant reduction in the weight of suckers formed but did not have any significant effect on yields of cured tobacco. MH did not affect the thickness or fire-holding capacity of the leaves nor their grading score. It did, however, increase the total N content by 7–10%. The position of the leaves on the plant had a marked effect, which was independent of MH treatment, on the characteristics measured. The upper leaves were thicker, and had a lower fire-holding capacity and a higher total N content, than the lower leaves.—Univ. Wis., and Agric. Res. Serv., U.S.D.A.

1569. Suyama, I.
Constituents of leaf tobacco as affected by MH spray to the plant. [Japanese, with English summary.]
Proc. Crop Sci. Soc. Japan, 1956, **24**(3): 156, from abstr. in *Biol. Abstr.*, *Sect. D*, 1957, **31**, No. 29,301.

An MH spray, applied to inhibit suckering, increased the content of total sugars in the leaves and reduced that of nicotine, but did not affect total N.—Hatano Tob. Exp. Stat.

Physiology and biochemistry.

(*See also* 1028, 1029, 1602h, s.)

1570. Wildon, C. E., Hamner, C. L., and Bass, T.
The effect of 2,4-dichlorophenoxyacetic acid on the accumulation of mineral elements in tobacco plants.
Plant Physiol., 1957, **32**: 243-4, bibl. 10.

Fifty ml. of a 0·1% solution of sodium salt of 2,4-D was poured into the sand around young tobacco plants grown in 8-in. pots. Two weeks later plants were harvested, dried and analysed for mineral elements. Content of P and K in the tops of treated plants was much less than in the tops of untreated plants. Calcium accumulated to greater amount in roots than in tops of treated plants, but there was no difference in accumulation of Ca in roots and tops of untreated plants. [From authors' summary.]—Mich. St. Univ. E. Lansing.

1571. Hildebrandt, A. C., Riker, A. J., and Muir, E.
Growth *in vitro* of marigold and tobacco tissue with nucleic acids and related compounds.
Plant Physiol., 1957, **32**: 231-6, bibl. 21.

Tobacco tissue of normal origin from the hybrid *Nicotiana glauca* × *N. langsdorffii* and marigold tissue of crown gall origin were grown in chemically defined culture media with addition of nucleic acids, their components or the antimetabolite thiouracil. Growth was strikingly stimulated by both filtered and autoclaved RNA at concentrations of 400 and 4,000 mg./l. while DNA had no effect at low concentrations and was strikingly inhibiting with 4,000 mg./l. RNA was furthermore an excellent source of N for the tobacco tissue but not for marigold tissue. DNA was not a good source of N for either tissue. Neither RNA nor DNA was a source of carbon for tobacco tissue. Tobacco tissue was inhibited by 400 mg./l. of adenine, cytosine, xanthine, thymine, and uracil, while hypoxanthine, guanine and ribose supported progressively more growth with increasing concentration. Marigold cultures were inhibited by 400 mg./l. of all the purines and pyrimidines. Adenine and guanine were the most inhibiting. Some stimulation occurred with low concentration of cytosine, guanine, and uracil and with ribose. Thiouracil was strikingly inhibitory to tobacco cultures with concentrations of 10 or more mg./l. Marigold cultures were inhibited by this compound only at 100 mg./l. The amounts of RNA that inhibited or stimulated these cultures, respectively, appeared comparable to the amounts inside stimulated dark green or inhibited light green tobacco leaves infected with TMV, which might clarify the characteristic mosaic symptoms. [From authors' summary.]—Univ. Wis., Madison.

1572. Cooper, W. D., and Loring, H. S.
The ribonucleic acid composition and phosphorus distribution of chloroplasts from normal and diseased Turkish tobacco plants.
J. biol. Chem., 1957, **228**: 813-22, bibl. 21.

A method is reported for the isolation and extraction of uniform preparations of chloroplasts from Turkish tobacco plants. Dried trichloroacetic acid-alcohol-ether-extracted normal preparations contained from 9 to 11% N, 0·36% P, about 3·0% ribonucleic acid (RNA), 0·7% deoxyribonucleic acid (DNA), and 0·02% P as phosphoprotein. Although no significant variations were found in the RNA composition of plants of different ages or between normal and diseased preparations, the RNA of Turkish tobacco chloroplasts is definitely different from that of tobacco mosaic virus. Certain chemical changes associated with P distribution were apparent in the chloroplasts as a result of virus infection. Diseased preparations contained significantly more RNA and less acid-soluble lipide P than did normal chloroplasts. [From authors' summary.]—Stanford Univ., Stanford, Calif.

1573. Yager, R. E., and Muir, R. M.
Amino acid factor in control of abscission.
Science, 1958, **127**: 82-3, bibl. 9.

Unfertilized ovaries of the flowers of two tobacco varieties were treated with solutions containing various amino acids. Leucine, alanine and glutamic acid caused a significant acceleration of abscission, but the outstanding effect was that of methionine. It is suggested that methionine, as a methyl donor, may interact with indoleacetic acid to control abscission.—St. Univ. Iowa, Iowa City.

1574. Dawson, R. F., and others.
Pathway of nicotine biogenesis.
Chem. Ind. Lond., 1958, No. 4, p. 100, bibl. 7.

Four specifically isotopic hydrogen labelled nicotinic acids were fed separately to sterile cultures of Turkish tobacco roots. Three of the acids were incorporated to a similar extent and the fourth to a much smaller extent. The results suggest that nicotine formation is a terminal process and that the final reaction in the general metabolism of the plant, beyond which the pathway leads only to nicotine, may be the oxidation of nicotinic acid or one of its derivatives to a corresponding 6-pyridone.—Columbia Univ., and Brookhaven nat. Lab., N.Y.

1575. Grimshaw, J., and Marion, L.
The pyridine ring and the problem of its biosynthesis.
Nature, 1958, **181**: 112, bibl. 12.

It was shown that anthranilic acid does not function as a precursor of the pyridine ring of nicotine in *Nicotiana tabacum*.—Nat. Res. Coun., Ottawa.

1576. Müller, R., and Berger, P.
Der Nikotinabbau durch Tabaksamen. **(Nicotine degradation by tobacco seeds.)** [Russian and English summaries ½ p. each.]
Ber. Inst. Tabakforsch., Dresden, 1957, **4**: 265-84, bibl. 11.

Tobacco seeds were placed in nicotine solutions. There was an initial intake of nicotine by the seed, after which any nicotine remaining in the solution was degraded. The rate at which degradation occurred was increased when the seeds had been allowed to imbibe water before being placed in the nicotine solution. Differences between seeds in their capacity for degradation were marked, but could not be related to type, origin, age or viability. Bacteria capable of nicotine degradation were also isolated from tobacco seeds and leaves. Succinic, malonic and oxalic acids were identified as degradation products of nicotine.

1577. Rizvi, S., and Krotkov, G.
Metabolism of the intermediate products of starch amylolysis in detached tobacco leaves.
Canad. J. Bot., 1958, **36**: 73-7, bibl. 2.

Detached tobacco leaves were placed on solutions of uniformly C^{14}-labelled glucose, "dextrins" and "oligosaccharides". All three carbohydrates were absorbed by the leaves, and their subsequent metabolism was found to be essentially the same. This observation eliminates the earlier suggestion that the absence of free maltose during the breakdown of starch in tobacco leaves is due to the fact that its precursors are exceptionally active and are metabolized away before they have a chance to give rise to free maltose. [From authors' abstract].—Queen's Univ., Kingston, Ont.

1578. Pyriki, C., and Herrmann, R.
Die organischen Säuren in den Blattgutarten des Tabaks und deren Beziehungen zur Qualität. **(The organic acids in different types of tobacco leaf and their relation to quality.)** [Russian and English summaries ½ p. each.]
Ber. Inst. Tabakforsch. Dresden, 1957, **4**: 285-307, bibl. 21.

Virgin Gold A, Wohlsdorfer Burley and Havana IIc had in general fewer total acids in the upper than in the lower leaves. The total acid content was separated into 2 groups, namely oxalic acid, and the rest, chiefly malic and citric acids, called "oxyacids". Oxyacids tended to decrease from the lower to the upper leaves, while oxalic acid showed the reverse trend. The same tendency was observed in fermented oriental leaf, and when classified according to leaf position oxalic acid was high and oxyacid contents were low in the better grades. Chinese tobacco, which was classified by another system, did not show this tendency. In the fermented tobacco types studied the highest contents of total acids reached almost 17% of dry matter. In general, oriental tobaccos contained more oxalic acid but fewer oxyacids than other types with large leaves.

1579. Dawson, R. F., and Wada, E.
Flavonoids and depsides of the green tobacco leaf. I. Rutin and chlorogenic acid.
Tobacco, N.Y., 1957, **144**(11): 18-21, bibl. 10.

A qualitative and quantitative survey has been made of the flavonoids and depsides contained in the leaves of one shade-grown and two sun-grown varieties of cigar tobacco. Chlorogenic acid was the predominating component. Rutin was present in greater concentration in the sun-type than in the shade-type. Chlorogenic acid content appeared to be correlated more with daylength than with shading. Two minor polyphenols are described which are closely related to chlorogenic acid. [Authors' summary.]—Columbia Univ., N.Y.

Diseases and pests.

(*See also* 1602a, c, i, j, u, v.)

1580. Joglar-Rodriguez, F.
Dangers of tobacco leaf curl.
Tobacco, N.Y., 1957, **145**(26): 14, 16, 21-2, bibl. 3, illus.

The symptoms are described of the leaf curl virus disease, which has been identified in several tobacco areas in Puerto Rico. Recommended control measures include the destruction of the alternate host plants, *Jatropha gossypifolia* (a medicinal plant) and *Sida carpinifolia*, and spraying seedbeds with DDT, parathion or malathion to control the whitefly vector, *Bemisia tabaci*.—Univ. P.R.

1581. Hidaka, Z., and others.
Studies on the tobacco stunt disease.
Bull. Hatano Tobacco Exp. Stat., 1956, No. 40, pp. 1-80, bibls, illus.

This bulletin consists of 11 papers [3 of which were abstracted from another source in *H.A.*, 28: 541-543] on various aspects of a new disease, which occurs in Japan and has caused considerable losses. The symptoms appear in the seed-bed on plants about 40 days old with 6–7 leaves. The internodes stop growing, the base of the plant becomes necrotic and strangulated. On the leaves faint chlorosis occurs with necrotic patterns, distortion and downward rolling. After transplanting, a rosette form is assumed with dark and narrow leaves. The disease can be conveyed to healthy plants only by grafting and is thought to be caused by a virus. Material obtained from diseased sap resembles a virus and consists of spherical particles about 18 mμ in diameter. These have been photographed. No vectors are known and the disease is believed to be soil borne. Numerous experiments with diseased soil are described. All the varieties of *N. tabacum* which were tested were found to be susceptible, but other species of *Nicotiana* were not. It may be controlled by sterilizing the seed bed soil with steam and, less effectively, by soil treatment with chloropicrin, DD or ethylene dibromide.

1582. LIMASSET, P.
Observations relatives au rôle des terreaux et des tabacs manufacturés dans la transmission du virus de la mosaïque du tabac. **(Observations on the role of composts and manufactured tobacco in the transmission of tobacco mosaic virus.)**
C.R. Acad. Agric. Fr., 1957, **43**: 749-52, bibl. 1.

Tobacco mosaic virus in composted, infected tobacco and tomato plants was inactivated by heat treatment at 95° C. for 20 minutes. Formaldehyde treatment did not affect the virus. Plant contamination by manufactured tobacco has been confirmed.—École nat. Agric., Montpellier.

1583. ORTIZ, G., AND VALDERRAMA, L. E.
Efectos del producto Vapam 4S (metilditiocarbamato de sodio anhidro) en el control de la enfermedad de la "dormidera" del tabaco. **(Effects of Vapam 4S (anhydrous sodium methyl-dithiocarbamate) in the control of Granville wilt of tobacco.)**
Agric. trop. Bogotá, 1957, **13**: 479-82, bibl. 2, illus.

The product contained 31% of active material. With 1 l. of Vapam in 10 l. of water, sprayed over 10 sq. m., the attack of Granville wilt (*Pseudomonas solanacearum*) involved 17·8% of the crop, compared with 83·3% in untreated plots. The effectiveness of the treatment was much reduced by using only 3 instead of 10 l. of water.

1584. HITIER, H., AND IZARD, C.
Quelques précisions sur l'emploi de la streptomycine dans la lutte contre le feu sauvage du tabac. **(Some data on the use of streptomycin in the control of wildfire disease of tobacco.)** [English summary ⅓ p.]
Ann. Inst. exp. Tabac Bergerac, 1957, **2**(4): 85-92, bibl. 5.

Tobacco seedlings can be protected from wildfire (*Pseudomonas tabaci*) by spraying denatured streptomycin at 100–200 mg./l. [see also *H.A.*, 27: 1636]. The addition of glycerol, at these concentrations, does not increase efficacy. Streptomycin treatment must, in practice, be combined with soil sterilization and plant sanitation measures.

1585. SHAW, L., AND LUCAS, G. B.
Further studies with streptomycin for wildfire control in burley tobacco plant beds, North Carolina, 1957.
Plant Dis. Reptr, 1957, **41**: 939-40, bibl. 2.

Studies on the control of wildfire (*Pseudomonas tabaci*) were continued at the Mountain Research Station, Waynesville, N.C., for the third successive year [for earlier results see *H.A.*, 26: 2895 and 27: 2572]. Excellent control resulted from 4 spray applications, at weekly intervals, of either streptomycin sulphate or streptomycin nitrate; a concentration of 200 p.p.m. gave better results than did one of 100 p.p.m. or than 3–4–50 bordeaux mixture. Good control was also obtained with 2 or 3 applications of streptomycin sulphate at 400 p.p.m. starting 1 week after the plants were inoculated.

1586. HILL, A. V.
Blue mould of tobacco—a review.
Tech. Pap. Div. Plant Ind., C.S.I.R.O., Aust. **9**, 1957, pp. 16, bibl. 67.

Blue mould of tobacco, caused by *Peronospora tabacina* Adam, is a disease of economic importance in the United States of America and in Australia. This review deals with the present state of knowledge of the pathogen, the disease, and methods of control. It shows that many factors require further investigation, particularly in Australia, in order to obtain the data essential for the development of more effective means of control. [Author's summary.]

1587. MANDRYK, M.
Control of blue mould *(Peronospora tabacina,* Adam) in infected tobacco seedlings.
J. Aust. Inst. agric. Sci., 1957, **23**: 319-22, bibl. 7, illus.

In glasshouse experiments 5 ml. of benzol each night prevented occurrence of blue mould in inoculated tobacco (*Nicotiana tabacum* L.) seedlings held in trays measuring 0·5 sq. m., provided that the use of benzol was commenced not later than 24 hours after inoculation. If seedlings were left untreated for from 2–6 days after inoculation, the quantity of benzol had to be increased to 10–30 ml. in order to obtain a high percentage of healthy seedlings. Benzol applied in the late stage of incubation of the pathogen may mask the disease and the organism becomes active again after cessation of treatment. [Author's summary.—C.S.I.R.O., Canberra.

1588. SMITH, W. A.
Root-knot nematode control investigations in tobacco in Queensland.
Qd J. agric. Sci., 1957, **14**: 155-65, bibl. 12.

Experiments in heavily infested, irrigated fields in N. Queensland showed that *Meloidogyne javanica* may be largely controlled by soil fumigation at 6 in. depth with 12½% EDB in power kerosene or with DD both at 10 gal./acre. Irrespective of the use of nematocides, even a trace of galling in the seedlings at transplanting can lead to heavy losses. Where tobacco is grown each year on the same site, galling increases at a greater rate than when tobacco is rotated with resistant crops. CBP as a soil fumigant was unpleasant to handle and apparently less effective than DD.

1589. PHILIP, A., AND JOSHI, B. G.
Dieldrin 5% W.P. in transplant water for the control of ground beetles attacking tobacco.
Indian Tobacco, 1957, **7**: 177-81, bibl. 7.

The ground beetles *Mesomorphus villiger*, *Sceleron latipes* and *Opatroides frater* attack newly planted seedlings. They were controlled by applying dieldrin 50% w.p. at 20–80 oz. per 100 gal. water, either in transplant water or as a soil spray just before transplanting.—Cent. Tob. Res. Inst., Rajahmundry.

1590. Dominick, C. B.
Flea beetle control on newly set tobacco.
Tobacco, N.Y., 1957, **145**(4): 144-5.

Experiments are described in which the standard insecticide DDT was compared with newer insecticides against *Epitrix hirtipennis*, both in the seedbed and in the field shortly after the seedlings had been planted out. In seedbeds excellent control was obtained with wettable powder sprays of DDT, dieldrin and aldrin and with dusts of DDT and dieldrin. Experimental Insecticide 7744, heptachlor and TDE were less effective. In the field good control was obtained with sprays of endrin, dieldrin, aldrin, DDT and heptachlor as wettable powders and with endrin, aldrin and heptachlor as emulsifiable concentrates.—Tob. Res. Stat., Chatham, Va.

1591. Michel, É.
Essai d'insecticides contre le ver jaune en 1956. **(Insecticidal trial against wireworms in 1956.)** [English summary ½ p.]
Ann. Inst. exp. Tabac Bergerac, 1957, **2**(4): 93-100, bibl. 1, illus.

H.24 (1·82% lindane plus 4·09% halogenized terpenes) used as a dust at 50 kg./ha. was 83·6% effective but more expensive than BHC. When used for dusting the tobacco roots prior to transplanting, H.24 was 88·5% effective, lindane 88%, aldrin 72·5% and parathion 68·5%. When used as a seedbed drench, lindane was 81·5% effective, lindane plus dieldrin 78·5%, H.24 66·5%, and parathion 59%. Lindane used alone was slightly phytotoxic. [For earlier trials see *H.A.*, 27: 3654.]

1592. Michel, É.
Toxicité de divers insecticides de synthèse vis-à-vis des vers gris s'attaquant au tabac. **(The toxicity of various synthetic insecticides to cutworms attacking tobacco.)** [English summary ⅓ p.]
Ann. Inst. exp. Tabac Bergerac, 1957, **2**(4): 101-10, bibl. 1.

In field trials *Euxoa segetum* larvae were partially controlled by dusting with 1% endrin (75% effective), 5% DDT (69·5% effective) and 5% aldrin (69·2% effective). These are primarily contact poisons and should be applied to the stem base and also to the soil around the plant. [For earlier trials see *H.A.*, 27: 3654.]

Harvesting, curing and fermentation.

(*See also* 1602d-f, k-n, t.)

1593. Toussaint, W. D., and Harwood, D. G.
Machine or hand harvesting tobacco?
Ext. Circ. N.C. agric. Ext. Serv. **413**, 1957, pp. 12, illus.

Comparisons between harvesting flue-cured tobacco by hand and with a self-propelled machine show that the machine reduces the labour needed per stick of tobacco harvested by about 25%, but that, owing to higher wages paid to some members of machine gangs, the saving in labour cost is less than 25%. Whether or not it would pay to purchase a machine will depend on the expected length of its useful life and on local wage rates, but even under conditions most favourable to machine harvesting a minimum of 10 acres per year would appear to be essential.

1594. Shaw, R. L., Baker, V. H., and Marshall, M.
Harvesting and curing aromatic tobacco.
Agric. Engng St. Joseph, Mich., 1957, **38**: 800-3, bibl. 12, illus.

Aromatic (Turkish) tobacco, normally imported into the U.S.A., can be grown in south eastern districts. This article describes the operations of harvesting the leaves, about 6 at a time per plant as they ripen, wilting on wires in the shade, curing in barns equipped with heating and forced draught systems, and baling. Labour needs are detailed and compared with those of Virginia tobacco.

1595. Beall, J. M.
Weather and the production of burley tobacco.
Bull. Amer. meteorol. Soc., 1957, **38**(2): 52-8, from *Biol. Abstr. Sect. D*, 1957, **31**, No. 39,308.

Tobacco in the U.S. is grown under a variety of microclimatic conditions each imposing its particular effects. The curing of burley tobacco depends particularly on the proper control of relative humidity. A humidity forecasting project was begun in 1954 in Kentucky by the Weather Bureau with the cooperation of the University of Kentucky. As a result some farmers using the service have received up to 7 cents a pound more than parity for their tobacco. Consequently the Weather Bureau has decided that the service is well worth while.

1596. Johnson, W. H., Hassler, F. J., and Henson, W. H., Jr.
Effects of bruising on tobacco curability.
Tobacco, N.Y., 1957, **145**(22): 42-4, bibl. 7, illus.

An impact device was used to bruise Dixie Bright 101 leaves with various amounts of force. Leaf tissues bruised when green did not yellow properly and showed impeded conversion of starch to sugars. Tissues bruised after yellowing turned a light brown colour, but, as might be expected, did not differ appreciably in total and reducing sugars from unbruised tissues.—N.C. St. Coll. and U.S.D.A.

1597. Johnson, W. H., Hassler, F. J., and Henson, W. H., Jr.
Some determinations pertinent to removal of midrib from bright-leaf tobacco during curing operations.
Tobacco, N.Y., 1957, **145**(18): 20-4, bibl. 9, illus.

In studies during 1954 and 1955 at the Oxford Tobacco Research Station, N.C., midribs were removed from leaves of Dixie Bright 101 tobacco at 3 stages, viz. before curing, when the leaves were yellowed and when they were cured. "Edge effects", i.e. the appearance of the leaf along the edge where the midrib was removed, were determined in mature, green leaves yellowed in cabinets, in which relative humidities of high and low drying potentials were maintained. There were negligible edge effects when the relative humidity was kept at 96%, but when it was kept at 82% there was a marked green edge effect, which was more pronounced when the midribs had been removed by tearing than when they had been removed by cutting. The studies also showed that a significant percentage of reducing sugar was translocated from the lamina to the midrib during yellowing in cabinets but not during yellowing in piles. Investigations showed that more force was needed to separate midribs from laminae in yellowed leaves than in green leaves. The question of when and how best to remove midribs is discussed in the light of these results.—N.C. St. Coll. and U.S.D.A.

1598. Hassler, F. J.
Leaf temperature measurement in tobacco curing research.
Tobacco, N.Y., 1957, **144**(15): 22-5, bibl. 7, illus.

This paper describes the use of thermocouples to measure temperatures inside leaves during curing, and discusses in detail the theoretical considerations which provide a basis for analysing the temperature records obtained and for assessing their accuracy. Results so far obtained have revealed that: (1) In a conventional tobacco barn temperature differences between the inside and outside leaves of a hand may be as high as 25° F.; (2) when yellowed tobacco was drying with air at 145° F., 20% R.H. and 20 ft./min. velocity the temperature of leaf tissues was 15° F. lower than that of the air; (3) below 110° F. the rate of browning was too slow to be perceptible, but at 135° F. it was so fast that total discoloration occurred within 6 minutes; and (4) the enzyme system that produces the browning reaction can be destroyed within 1 second at 212° F.—N.C. St. Coll., Raleigh.

1599. Zucker, M., and Bryan, W. H.
Simulated curing and fermentation of green cigar binder tobacco by chemical oxidation.
Tobacco, N.Y., 1957, **145**(6): 20-3, bibl. 8.

Studies are described in which freshly harvested tobacco leaves were dried at 23-25° C. or at 80° C., powdered and treated with sodium hypochlorite solution and finally re-dried and re-powdered. The effects of the treatment on soluble brown pigment, chlorophyll and other constituents are recorded. The results suggest that the chemical oxidations obtained simulated in some respects those which occur when cigar tobacco is air-cured. It is believed that the procedure may make possible a better understanding of the chemistry of the curing process and might in consequence point the way to technological improvements.—Conn. agric. Exp. Stat., New Haven.

1600. Philipp, W.
Der Zustand des Tabaks vor und nach der Fermentation und Möglichkeiten zu dessen Kontrolle. **(The state of tobacco before and after fermentation and possibilities of its control.)** [Russian and English summaries ¼ p. each.]
Ber. Inst. Tabakforsch. Dresden, 1957, **4**: 308-22, bibl. 13, illus.

Changes in leaf colour, external aroma, leaf suppleness, aroma of the smoke, water content, hydroscopicity, moisture saturation and oxygen absorption have been observed and measured. From these changes the differences between fermented and non-fermented tobacco, the degree of fermentation, and the stability of the tobacco during post-fermentation storage may be estimated. Water contents were measured by an infra-red apparatus [*H.A.*, 26: 3892n]. Measurements of hydroscopicity have shown that it decreases with increasing warmth and moisture during fermentation. Moisture saturation was measured by Maškovcev's apparatus. The importance of determining the oxygen index of domestic tobaccos is explained.

1601. Gilmore, L. E.
Fermentation studies of tobacco. 1. Nitrogen composition of five grades of cigar tobacco before and after fermentation.
Lighter, 1957, **27**(4): 12-16, bibl. 6.

Samples representing 5 fermentation stages were analysed for 6 nitrogen constituents. It was concluded that the lower the N percentage, the better the tobacco quality.

Noted.

1602.

a Anon.
Note sur quelques chenilles pouvant s'attaquer au tabac à la pente. **(A note on certain caterpillars able to attack tobacco during curing.)**
Rev. int. Tabacs, 1957, **32**: 233, illus.
Sporadic damage in France; lindane fumigation suggested for control.

b Anon.
Tobacco.
Planter, Kuala Lumpur, 1957, **33**: 753-8, bibl. 5.
Instructions on growing tobacco in Malaya.

c Apple, J. L.
Better black shank resistance.
Res. and Fmg N.C., 1957, **16**(2): 8-9, illus.
Hybrids of *N. plumbaginifolia* × tetraploid variety 402.

d Bennett, R. R., Hawks, S. N., Jr., and Perry, A.
Handling and preparing flue-cured tobacco for market.
Ext. Circ. N.C. agric. Ext. Serv., **410**, 1957, pp. 12, illus.
Facilities needed, sorting, tying and description of grades.

e Bennett, R. R., and Perry, A.
Preparing burley tobacco for market.
Ext. Circ. N.C. agric. Ext. Serv. **412**, 1957, pp. 12, illus.
Stripping, grading, bulking, tying, marketing.

f Dewey, A. W.
A market guide for the cigar binder types of tobacco.
Progr. Rep. Storrs agric. Exp. Stat. **23**, 1957, pp. 12.
An economic study of a shrinking market.

g Felklová, M.
Kompostování tabákového odpadu a lodyh užitím dřevokazných hub. **(Composting of tobacco waste and stalks by means of wood-destroying concentrates.)** [Russian, English and German summaries, 1¼, 1 and ¾ p. respectively.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1957, **30**: 1235-52, bibl. 12.
A method of inoculation with fungi.

h GLASZIOU, K. T.
Effect of 2,4-dichlorophenoxyacetic acid on pectin methylesterase in tobacco pith sections.
Nature, 1958, **181**: 428-9, bibl. 5.

i HIRAI, T., SHIMOMURA, T., AND NISHIKAWA, Y.
Effect of thiosemicarbazones on the multiplication of tobacco mosaic virus.
Nature, 1958, **181**: 352-3, bibl. 4.
Among several derivatives benzalacetone was the most effective inhibitor.

j LEGGE, J. B. B.
Insect control programme suggested for the 1957-58 season.
Rhod. Tobacco, 1957, No. 15, pp. 9-10.
Routine treatments and control of occasional pests.

k PERRY, A., AND BENNETT, R. R.
Curing burley tobacco.
Ext. Circ. N.C. agric. Ext. Serv. **411**, 1957, pp. 12, illus.
Recommended procedure, including use of supplementary heaters.

l RESNIK, F. E., LEE, L. A., AND POWELL, W. A.
Chromatography of organic acids in cured tobacco.
Tobacco, N.Y., 1957, **144**(6): 18-22, bibl. 16.
Procedure for qualitative identification and quantitative determination.

m ROWLAND, R. L., LATIMER, P. H., AND GILES, J. A.
Flue-cured tobacco. I. Isolation of solanesol, an unsaturated alcohol.
Tobacco, N.Y., 1957, **144**(24): 24-8, bibl. 20.
Present as about 0·4% of the dry weight of cured and aged leaves.

n STEDMAN, R. L.
Polyphenolic constituents of tobacco.
Tobacco, N.Y., 1957, **145**(15): 22-7, bibl. 57.
A review.

o U.S. DEPARTMENT OF AGRICULTURE.
Annual report on tobacco statistics, 1956.
Statist. Bull. U.S. Dep. Agric. **200**, 1957, pp. 71.
Production and trade, mainly in the last 5 years.

p U.S. DEP. AGRIC., FOREIGN AGRICULTURAL SERVICE.
World tobacco analysis. Foreign marketing.
Foreign Agric. Rep. U.S. Dep. Agric. **96**, 1957, pp. 22.
World trade in 1956 and production for first half of 1957.

q VALLEAU, W. D.
Yellow Crittenden—a mutant in dark tobacco.
Tobacco, N.Y., 1957, **144**(25): 20-1, bibl. 4.
A mutant of Little Crittenden; genetical aspects.

r VALLEAU, W. D., AND STOKES, G. W.
Virescent—a chlorophyll deficiency in tobacco.
Tobacco, N.Y., 1957, **145**(20): 20-1, bibl. 5, illus.
A mutant found in burley and dark tobaccos; genetical aspects.

s WADA, E.
Microbial degradation of the tobacco alkaloids and some related compounds.
Arch. Biochem. Biophys., 1957, **72**: 145-62, bibl. 28.
Transformation of nicotine, nornicotine and anabasine by 2 bacteria.

t WEYBREW, J. A.
Estimation of the plastid pigments of tobacco.
Tobacco, N.Y., 1957, **144**(1): 18-22, bibl. 12.
A rapid spectrophotometric method for chlorophylls, carotenoids and xanthophyll.

u WOLF, F. A.
Notes on tobacco diseases and disorders in Venezuela.
Tobacco, N.Y., 1957, **145**(2): 20-1, bibl. 8.
Including a note on 2,4-D injury.

v WOLF, F. A., AND FLOWERS, J. M., JR.
Tobacco anthracnose and toxin production.
Tobacco, N.Y., 1957, **144**(26): 26-31, bibl. 21, illus.
Colletotrichum nicotianae elaborates 2 toxins, one producing wilting, the other necrosis.

MISCELLANEOUS TEMPERATE AND TROPICAL PLANTS.

Condiment and spice plants.

(*See also* 1478, 1479, 1672a-c, h, s, 1673 l, m.)

1603. FERRARA, A.
Tecnologia delle specie. Cardamomi e altri semi aromatici di Zingiberacee. Noce moscata e macis. (**Technology of spices. Cardamoms and other aromatic seeds of the Zingiberaceae. Nutmegs and mace.**)
Riv. Agric. subtrop. trop., 1957, **51**: 393-412.

The productive life, harvesting, drying, preparation, grading, packing, composition and uses of cardamoms (*Elettaria cardamomum*) and nutmegs are described. Brief notes are also included on *Amomum* spp. and *Aframomum meleguetta*, and on nutmeg adulteration. [See *H.A.*, 27: 2847, 3665, and 28: 590 for earlier articles in this series.]

1604. DE HAAN, P. H.
Zwadmaaien van karwij. (**Swathing caraway.**)
Landb. Mech., Wageningen, 1957, **8**: 262, from *Agric. hort. Engng Abstr.*, 1958, Vol. **9**, Abstr. 104.

Because the irregular ripening of caraway presents difficulties for mechanical binding and threshing, trials were made in which the crop was cut and left in swaths for 9 days (during which period the rainfall was 39·2 mm.), and then picked up and threshed by a combine-harvester. Good-quality, mould-free seed was obtained, and savings in labour and costs appear possible compared with other methods of harvesting. The trials are to be continued.

1605. JACOBS, A., AND MATON, A.
Le séchage de la chicorée sur séchoirs à tirage naturel et à tirage artificiel. (**Drying chicory in kilns with natural and forced draughts.**) [English and German summaries 5 lines each.]
Rev. Agric. Brux., 1957, **10**: 1100-18, bibl. 2, illus.

The use of a ventilator in kilns to remove the water vapour given off by sliced chicory roots has improved the quality of the dried chicory and reduced fuel consumption.—Stat. Génie Rural de l'État, Lemberge.

1606. WHITE, R. T.
Studies on the storage and shipment of whole black pepper grown in the Orient.
J. econ. Ent., 1957, **50**: 423-8.

Tests showed conclusively that whole black pepper, when properly cleaned and dried to less than 11% moisture, can be stored without growth of surface moulds in double burlap bags with sealed polythene liners, 0·003 in. or more thick. Exploratory laboratory tests on insect penetration were not conclusive, but when bags are handled carefully and the liners kept unpunctured the risk appears to be slight.—Stored-Product Insects Sect., agric. Market. Serv., U.S.D.A.

1607. CHLÁDEK, M., AND KOŠOVÁ, V.
Vyšlechtění nové výnosné odrůdy tymiánu obecného (*Thymus vulgaris* L.). (**Cultivation of a new productive variety of thyme.**) [Russian, English and German summaries ½ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1957, **30**: 1099-1110, bibl. 33.

Among 20 thyme clones the highest yields of green and dried herbage were obtained from Nos. 5 and 14. Size and density of oil glands on the leaves were measured on all clones, but no correlation was found between density and oil yield. The average essential oil content of the first crop was 1·91%, and of the second crop 2·77%, which is well above the minimum required by Czechoslovakian pharmaceutical regulations. Clone No. 15 had the highest oil contents (2·7% and 3·5%) and No. 39 the highest phenol contents (70 and 72%).

1608. THEIS, T., AND JIMÉNEZ, F. A.
A vanilla hybrid resistant to *Fusarium* root rot.
Phytopathology, 1957, **47**: 579-81, bibl. 13, illus.

Certain hybrids between *Vanilla planifolia* and *V. phaeantha*, a species resistant to root-rot caused by *Fusarium batatatis* var. *vanillae*, grew poorly as a result of the disease; others were vigorous and resistant. No particular growth character appeared to be associated with disease reaction. Size of flowers, leaves and pods were intermediate and fruit quality was below that of *V. planifolia*. The flowering habits of the hybrids were erratic.—Fed. Exp. Stat., Mayaguez, P.R.

1609. MUZIK, T. J.
Role of parenchyma cells in graft union in vanilla orchid.
Science, 1958, **127**: 82, bibl. 3.

Grafts of *Vanilla planifolia* on *V. phaeantha* and on its own stems formed parenchyma bridges within 2 months, but, although some of the scions survived for over 2 years and made considerable growth, there was no evidence that any vascular tissues formed across the graft union. It is clear, therefore, that the parenchyma cells must have served for upward and downward translocation, and the possibility is suggested that they could play a similar role in intact plants.—Fed. Exp. Stat., Mayaguez, P.R.

1610. PLENET, R.
Note sur la maladie noire du vanillier à la Réunion. (**Note on the black disease of vanilla in Réunion.**)
Rev. agric. Réunion, 1957, **57**: 148-55, illus.

Two diseases have been given the same name, an anthracnose and a stem rot. The fungi *Phytophthora jatrophae*, *Glomerella vanillae* and *Calospora vanillae* have been variously identified. They are commonly found as wound pathogens where vanilla is intercropped with sugar cane. Where vanilla is grown under tree shade, high humidity also favours the disease. As control measures the author recommends reducing the humidity and shade, the application of copper fungicides, and cultural treatments such as mulching which improve the vigour of the plants.

Drug plants.

(*See also* 1016, 1467, 1672d, f, i, m, o, p, t, 1673b, f, h, 2014.)

1611. JAYAWEERA, D. M. A.
Indigenous and exotic drug plants grown in Ceylon. Part IV.
Trop. Agriculturist, 1957, **113**: 55-85, bibl. 24, illus.

As in previous articles in this series [*H.A.*, 25: 1841 and earlier] notes are supplied on the characteristics, composition and uses of a number of drug plants as follows: Derris (*D. elliptica*), euphorbia (*E. hirta*), fennel (*Foeniculum vulgare*), gentian substitute (*Azadirachta indica*), ipecacuanha (*Cephaelis ipecacuanha*), linseed (*Linus usitatissimum*), nutmeg (*Myristica fragrans*), nux vomica (*Strychnos nux vomica*), cajuput leaf and twig oil (*Melaleuca leucodendron*), chaulmoogra seed oil (*Taraktogenos kurzii*), croton seed oil (*Croton tiglium*), hydnocarpus seed oil (*Hydnocarpus wightiana* and *H. venenata*), castor oil (*Ricinus communis*), sandal wood oil (*Santalum album*), sesame oil (*Sesamum indicum*), mustard volatile oil (*Brassica nigra*), theobroma oil or cacao butter (*Theobroma cacao*), papain (*Carica papaya*), pelletierine tannate from the pomegranate (*Punica granatum*), picrotoxin (*Anamirta paniculata*), black pepper (*Piper nigrum*), pyrethrum (*Chrysanthemum cinerariaefolium*), quassia substitute (*Quassia amara*), rauwolfia (*R. serpentina*), senna leaf (*Cassia acutifolia* and *C. angustifolia*), stramonium

(*Datura stramonium* and *D. tatula*), strophanthus (*S. sarmentosus* and *S. hispidus*), tamarind (*Tamarindus indica*), tonka bean (*Dipteryx odorata*), and ginger (*Zingiber officinale*).

1612. Nowiński, M.
Wpływ czynników ekologicznych na zawartość związków czynnych w roślinach leczniczych. **(The effect of ecological factors on the content of active principles in medicinal plants.)**
Biul. państw. Inst. Nauk. leczn. surow. Rośl. Poznaniu, 1956, **2**(2): 94-116, from *Ref. Ž.* (*Biol.*), 1957, No. 15, Abstr. 65,128.

In Poland 70% of medicinal plants are grown on special farms. Data are given, from world literature, on the effects of different macro- and micro-elements on medicinal plants in general and on the effects of N, P and K on alkaloid contents in particular. Results of investigations on the effect of vitamins and antibiotics on medicinal plants are described, and work on acclimatization and cultivation is summarized.

1613. Hassall, C. H., and Smith, B. S. W.
Hecogenin from *Agave sisalana* by microbiological hydrolysis.
Chem. Ind. Lond., 1957, No. 48, p. 1570, bibl. 9.

In the commercial preparation of hecogenin from sisal leaves, the freshly expressed juice is allowed to stand producing a precipitate, which, after hydrolysis with dilute sulphuric acid, yields crude hecogenin. The present paper outlines an alternative procedure involving the use of micro-organisms for hydrolysis.—Univ. Coll. West Indies, Jamaica.

1614. West, F. R., Jr., and Mika, E. S.
Synthesis of atropine by isolated roots and root-callus cultures of belladonna.
Bot. Gaz., 1957, **119**: 50-4, bibl. 20, illus.

In studies on *Atropa belladonna* atropine was obtained in measurable amounts from isolated roots and root-callus tissue, that had been cultured on nutrient media in darkness, but not from excised stem- and leaf-callus tissues, which had been grown *in vitro* for at least 4 months without forming macroscopic adventitious roots. The root-callus tissue was also found to possess the capacity for unlimited growth *in vitro* and for the development of an entire plant possessing roots, stems and leaves.—Dep. Pharmacol., Univ. Chicago.

1615. Hochstein, F. A., and Paradies, A. M.
Alkaloids of *Banisteria caapi* and *Prestonia amazonicum*.
J. Amer. chem. Soc., 1957, **79**: 5735-6, bibl. 10.

Samples of the hallucinogenic plant, *Banisteria caapi*, from Peru yielded harmine as the main alkaloid and smaller quantities of the alkaloids harmaline and *d*-tetrahydroharmine. Aqueous extracts of the leaves of *Prestonia* (*Haemadictyon*) *amazonicum*, obtained in the same region, yielded substantial amounts of another psychotomimetic amine, N,N-dimethyltryptamine, which has also recently been identified as a component of the seeds of certain *Piptadenia* species.—Chas. Pfizer & Co., Brooklyn, N.Y.

1616. Abiusso, N. G.
Estudio químico de algunas especies argentinas del género *Cassia*. Investigación y determinación de derivados antracénicos. **(Chemical study of certain Argentine species of the genus *Cassia*. Investigation and determination of anthracene derivatives.)** [English summary ½ p.]
Rev. Invest. agríc. B. Aires, 1957, **11**: 259-85, bibl. 41.

As sources of senna the most promising Argentine species were *C. arnottiana*, *C. corymbosa*, *C. subulata*, *C. bicapsularis* and *C. occidentalis*, but their content of active principles was lower than that of the imported *C. angustifolia*. [See also *H.A.*, 27: 3675.]

1617. Meenakshi, S.
They make money with senna in the south.
Indian Fmg, 1957, **7**(8): 6-7, illus.

Grown as a semi-irrigated catch crop on rice land after the rice harvest, senna (*Cassia angustifolia*) has been found in trials to yield up to 2,200 lb./acre of cured leaves and 165 lb./acre of pods. It can be used as a green manure crop.

1618. Mamedov, G. M.
Phytochemical studies on *Centaurea solstitialis* growing wild in Azerbajdžan. (Preliminary communication.) [Russian.]
Apteč. Delo, 1956, **5**(5): 57, from *Ref. Ž.* (*Biol.*), 1957, No. 14, Abstr. 60,884.

The following value were found in the herbage and flowers respectively: alkaloids 0·05 and 0·03%, saponins nil, anthraglycosides nil, tannins 1·8 and 3·34%, resins 3·2 and 5·84%, fats 2·38 and 4·61%, extractives 19·8 and 25%, ash 9·38 and 5·2%.

1619. Zderkiewicz, T.
Biologia tysiącznika w związku z wprowadzeniem go do uprawy. **(The biology of centaury in relation to its cultivation.)** [English and Russian summaries ¼ p. each.]
Roczn. Nauk rol., Ser. A, 1957, **75**: 413-31, bibl. 18.

An account is given of the medicinal properties, morphology and anatomy, and of the biology of seed germination, of *Erythraea centaurium*. Under conditions of the middle Lublin area plants producing the highest yield and best quality raw material were obtained from seed sown between July 10 and August 19.

1620. Romero Castañeda, R.
Productos forestales de Colombia. La raicilla, *Cephaelis ipecacuanha* (Brot.) A. Rich. **(Colombian forest products. Ipecacuanha *(Cephaelis ipecacuanha)*.**
Agric. trop. Bogotá, 1957, **13**: 583-9, bibl. 5, illus.

Cultivation, propagation, harvesting and preparation are briefly described, and chemical composition figures are quoted for the plant, its ash, and the type of soil in which it normally grows.

1621. Ljukšenkova, E. Ja.
Accumulation of active principles in celandine, *Chelidonium majus*. [Russian.]
Apteč. Delo, 1956, **5**(5): 54-6, from *Ref. Ž.* (*Biol.*), 1957, No. 14, Abstr. 60,882.

Alkaloid, vitamin C and carotene determinations were made on wild plants of *C. majus*. The alkaloid content was highest at bud formation, amounting to 2·25% of dry weight. At seed maturity it declined in the aerial parts to 0·97%. In the roots the alkaloid content was highest (4·14%) when the stem died down. The maximum ascorbic acid content was found during the most vigorous growth period, there being 956·63 mg./% in the basal leaves and 1,042·89 mg./% in the upper leaves. The carotene content was highest during flowering. It is recommended that celandine should be harvested before flowering when the combined content of active principles is at its highest.

1622. Schuster, G.
Untersuchungen über die Auswirkungen von Virusbefall auf den Alkaloidgehalt von *Datura stramonium* L. var. *stramonium*. **(The effects of virus disease on the alkaloid content of *Datura stramonium*.)** [English summary 15 lines.]
Phytopath. Z., 1957, **31**: 123-32, bibl. 24, illus.

The infection of young *Datura stramonium* var. *stramonium* plants with potato-X virus resulted at first in an increase in alkaloid content but later in a marked reduction. In addition, the content of scopolamine in relation to total alkaloids was reduced. The significance of early virus infection for the yields of medicinal plants is emphasized and a physiological explanation of the changes in alkaloid content following infection is briefly attempted.—Inst. Phytopath., Karl-Marx-Univ., Leipzig.

1623. Rizzini, C. T., and Bastos, M. L.
Datura insignis Barb. Rodr.: Seus alcalóides. **(Alkaloids of *Datura insignis*.)**
An. Acad. brasil. Cien., 1956, **28**: 473-8, illus., from *Biol. Abstr. Sect. D*, 1957, **31**, No. 39,465.

Datura insignis has long been used by Amazonian natives for its soporific effects. It contains 0·3% scopolamine, 0·02% hyoscyamine and traces of meteloidine, and might be used as a source of these drugs.

1624. Mortimer, P. I.
A note on *Duboisia myoporoides* R. Br. from the Acacia Plateau, near Killarney, Queensland.
Aust. J. Sci., 1957, **20**: 87-8, bibl. 7.

Mistletoe (probably *Loranthus alyxifolius*) growing on a "physiological form" of *Duboisia myoporoides*, which contained alkaloids not usually present in this species [*H.A.*, 28: 598], was found to contain the same alkaloids, namely nicotine, hyoscine, anabasine and *iso*pelletierine, though in lesser proportions.—C.S.I.R.O., Canberra.

1625. Chaudri, I. I.
Pakistani *Ephedra*.
Econ. Bot., 1957, **11**: 257-62, bibl. 3, illus.

The source of natural ephedrine, *Ephedra gerardiana*, is a shrub growing wild in the mountains of west Pakistan. The green branches, which bear reduced leaves, are reaped from October to December when the alkaloid content is highest (1·0-2·5%) and are dried in the sun, separated into internodes by beating and finally sieved. *E. intermedia* sometimes occurs as an adulterant. The product is processed at Quetta but synthetic ephedrine is a competitor.

1626. Cole, F. R.
The pharmacognosy of Utah pinyon pines.
Diss. Abstr., 1957, **17**: 375-6, being *Publ.* 18,711 of 71 pp.

Utah pinyon pines (*Pinus edulis*, *P. monophylla* and a probable hybrid) yielded pinyon oil at a rate of more than 60 gal. per acre. Branches should be collected from May to November for highest yields.—Univ. Utah.

1627. Rizzini, C. T.
Rauwolfia. **(*Rauwolfia*.)**
Rodriguésia, 1954, No. 28/29, pp. 5-8, [received 1958].

Reserpine contents are quoted for different plant organs of *Rauwolfia serpentina*, *R. vomitoria*, *R. canescens* and *R. heterophylla*. The Brazilian species *R. sellowii* is much richer in reserpine than any of these. *R. ternifolia* and *R. grandiflora* are under investigation for their medicinal value. The alkaloids of *Aspidosperma* and *Geissospermum* spp. and of *Lochnera rosea* have proved much stronger in action than the reserpine of *Rauwolfia* spp.

1628. Sobti, S. N., Handa, K. L., and Chopra, I. C.
Propagation of *Rauvolfia serpentina* in Jammu and Kashmir.
J. sci. industr. Res., India, 1957, **16A**: 268-9.

Seeds which sank in 10% $NaCl$ solution gave 20% germination. Less dense seeds had lower germination rates. Roots of 1-year-old plants contained 1·6% alkaloid compared with 1·7% in 2- and 3-year-old plants.—Drug Res. Lab., Jammu.

1629. de Bruyn, J. W.
Het gehalte aan mydriatische alkaloiden van *Scopolia lurida*. **(The content of mydriatic alkaloids in *Scopolia lurida*.)** [English summary 13 lines.]
Reprinted from *Pharm. Weekbl.*, 1957, **92**: 547-51, bibl. 11, illus., as *Meded. Inst. Vered. Tuinbouwgew.* **117**.

Scopolia lurida proved to be hardy at Wageningen. Air-dried material of the aerial portion of the plant contained 0·32% alkaloids, chiefly hyoscyamine. The total alkaloid content of the roots was 1·05%, including 0·5% mydriatic alkaloids; the roots also contained cuscohygrine.

Essential oils.

(*See also* 1016, 1545f, 1652, 1672k, l, r, 1673c, 1749.)

1630. Volhovskaja, U. V.
***Cinnamomum camphora* as a native source of safrole.** [Russian.]
Maslob.-žir. Prom-st', 1956, No. 4, pp. 14-15, from *Ref. Ž.* (*Biol.*), 1957, No. 13, Abstr. 55,717.

Two-year-old plants of *Cinnamomum camphora* planted at Suhumi in 1940 yielded about 35 t. of roots per ha. in the 3 years following. The essential oil content of air dried roots of *C. camphora* was 1·5% and that of *C. granduliferum* 1·3%. The oil of the former contained 90% safrole + 5% camphor, that of the latter 93% safrole + 3% camphor. From the foliage, amounting to 40 t. per ha., an additional 400 kg. per ha. of camphor oil can be obtained.

1631. KORNEVA, E. I.
The role of mass selection in improving the quality of mint planting material. [Russian.]
Krat. Otčet o naučn.-issled. Rabote Vses. u.-i. In-ta maslič. i efiromasl. Kul'tur VASHNIL za 1955, Krasnodar, 1956, pp. 73-6, from *Ref. Ž.* (*Biol.*), 1957, No. 13, Abstr. 55,882.

During improvement work in the Ukraine it was found that variations in the essential oil content of the dry leaves and flowers of mint within a clone were insignificant (2·5–2·48%), but that variations in the weight of dry leaves and roots were large, amounting to 133 and 113% respectively. It is suggested that in selection work the most variable character, namely plant vigour, should be given prior consideration.

1632. DAVIS, J. F., LUCAS, R. E., AND SHEPHERD, L. N.
Mint grown on organic soils.
Bett. Crops, 1957, **41**(10): 28-36, illus.

Two species are grown in Michigan: *Mentha piperita*, peppermint, mostly the black Mitcham variety, and *M. spicata*, spearmint, the Scotch variety being the most productive. The crop is planted from stolons or runners closely spaced in small furrows 32 in. apart. The first crop (row mint) is reaped the same year; future crops are known as meadow mint. Yields can reach 90 lb./acre of oil but are depressed by wilt disease (*Verticillium albo-atrum*) and are very variable from season to season and not always in proportion to leaf yields. Experiments, summarized here, have indicated large responses to fertilizers, and 100 lb./acre each of P_2O_5 and K_2O plus 25 to 50 lb./acre of N are recommended. Meadow mint responses have been less than those of row mint. Manganese and copper are also recommended. Under dry or frosty conditions irrigation is advisable, and this may reduce wilt attack. Transplanting is less effective than planting roots because wilt injury is more likely. Roots should be planted 4–5 in. deep. Wilt increases with prolonged production without rotation. The crop needs minimum tillage, and weed control by herbicides is recommended. Optimum time of harvest is critical and the leaf should not be over-dried; about 2 days' drying is best. The leaf, coarsely chopped, is then steam-distilled for about 50 minutes. The spent leaf may be returned to the land or used as fodder. Oil quality can be impaired by weed contamination, faulty distillation and by very short or very long day lengths during the growing period.

1633. ĆOROVIĆ, M.
Uticaj fluorescentne svetlosti na biljke *Mentha piperita* i *Origanum heracleoticum*. **(The effect of fluorescent light on *Mentha piperita* and *Origanum heracleoticum*.)**
Acta pharmac. jugosl., 1955, **5**(3): 153-9, from *Ref. Ž.* (*Biol.*), 1957, No. 15, Abstr. 65,131.

M. piperita and *O. heracleoticum* were grown under white, blue-white and red-white fluorescent light. The experimental plants were taller and paler than the controls, had smaller organs, under-developed outer tissues and thinner cell walls. *M. piperita* under white and blue-white light had a lower, and under red-white light a higher, essential oil content than the controls. *O. heracleoticum* under white and red-white light had a higher, and under blue-white light a lower, essential oil content than the controls.

1634. GOSS, R. C.
Chlorobromopropene as a control of *Verticillium albo-atrum* R. & B. in *Mentha piperita* L.
Diss. Abstr., 1957, **17**: 2094, being *Publ.* 22,256 of 115 pp.

Soil treatment with chlorobromopropene at 120 gal. per acre reduced *Verticillium albo-atrum* infection from 38·6% (untreated) to 14·6%, and a residual effect was noted in the second year. Rates of 40 and 80 gal. per acre reduced infection to a lesser extent. The peppermint oil extracted was within legal standards.—Purdue Univ.

1635. VJAZOV, A. A.
New forms of sweet basil for the preserving industry. [Russian.]
Bjul. Gl. bot. Sada AN SSSR, 1956, No. 26, pp. 28-37, from *Ref. Ž.* (*Biol.*), 1957, No. 15, Abstr. 65,129.

A description is given of methods used at the Nikitskij botanic garden for selecting *Ocimum basilicum* for high yields of green matter, rapid growth, resistance to diseases and pests, and aroma. As a result of this work 2 new varieties, Nikitskij Nos. 42 and 72, characterized by a peppery aroma, were introduced into cultivation.

1636. GREŠNYH, B.A.
Top dressing basil. [Russian.]
Krat. Otčet o naučn.-issled. Rabote Vses. n.-i. In-ta maslič. i efiromasl. Kul'tur VASHNIL za 1955, Krasnodar, 1956, pp. 216-19, from *Ref. Ž.* (*Biol.*), 1957, No. 13, Abstr. 55,884.

Of 7 methods tested in an experiment in the Krasnodar region top dressing hot-bed-grown basil with an organo-mineral combination gave the best results, yielding 12·9 kg. essential oil per ha. The treatment consisted of a solution of 0·2% potassium nitrate+0·4% superphosphate, a 1 : 10 solution of chicken manure, and a 0·3% solution of ammonium nitrate, all applied at 5–6 l. per frame.

Fibres.

(*See also* 1053, 1420, 1672y, 2006.)

1637. RJUMINA, G. A.
Monoecious hemp growing. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1957, **22**(7): 30-4.

Crops of monoecious hemp [*Cannabis sativa*] are more uniform at maturity than are crops of dioecious hemp. The effects of seed rates and methods of sowing on growth, weight of plants, and fibre and seed yields were studied at the Institute for Fibre Plants. he best yield of long fibre (8·1 centners per ha.) was obtained from continuous drilling at a seed rate of 80 kg. per ha., but the highest seed yields (7·6–7·8 centners per ha.) came from band sowing at 30–40 kg. per ha.

1638. Bernardo, F. A.
Plant characters, fiber, and cytology of *Musa balbisiana* × *Musa textilis* F_1 hybrids.
Philipp. Agric., 1957, **41**: 117-56, bibl. 45, illus.

In a breeding programme, designed primarily to produce abacá hybrids resistant to mosaic, crosses have been made between the resistant pacol (*M. balbisiana*) and the susceptible abacá (*M. textilis*). Detailed studies on the morphology and cytology of selected F_1 seedlings are described. As to fibre characters the seedlings varied greatly. The majority contained very low percentages of extractable fibre and only one contained an amount comparable with that found in abacá. The tensile strength and other quality characteristics of the fibres of the hybrids were also unsatisfactory.

Hops.

(*See also* 1081k, 1082b, 1135, 1672j, u, 1673a, d, i, j, o.)

1639. Zub, L.
Próba oceny wartości produkcyjnej klonów chmielu hodowli IHAR w Puławach. (**The estimation of yields of hop clones bred at the Institute of Plant Breeding and Acclimatization, Pulawy.**) [Russian and English summaries ½ p. each.]
Roczn. Nauk rol., Ser. A, 1957, **76**: 131-56, bibl. 19.

New Polish hop clones were shown to have higher resin contents than had Czech and Russian hop varieties, which showed greater annual variation. Daily growth increments of hops protected from wind were greater than in unprotected hops, which suggests that humidity is important for rapid growth. [For earlier results see *H.A.*, 27: 1678.]

1640. Zub, L.
Obserwacje nad sposobami szybkiego rozmnażania chmielu metodą wegetatywną. (**Observations on rapid methods of propagating hops.**) [Russian and English summaries ⅔ p. each.]
Roczn. Nauk rol., Ser. A, 1957, **76**: 117-29, bibl. 11.

Four types of propagating material were used in hop propagation studies, viz. rhizomes, offsets, pieces of underground stem with 1–2 eyes, or aerial stem pieces 3–5 cm. long. During the period of the experiments rooting under glass of rhizomes amounted to 90%, of underground stem pieces 89%, of offsets 61% and of aerial stem pieces 25%. Underground stem pieces gave good results even when planted directly in the nursery. When using aerial stems the portion between the third and fifth internodes gave the best results.

1641. Hautke, P., and Zázvorka, M.
Význam ztlustlých kořenů chmele. (**Studies on root thickening in hops.**) [Russian, English and German summaries ⅔ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1957, **30**: 799-810, bibl. 8, illus.

Hop roots function as reserve organs, possessing a high starch content. Late spring planting resulted in reduced growth and in low starch accumulation in the roots. When hops were planted at the end of March starch contents reached 17% by mid-October, but when planting was delayed until mid-May the starch content only reached 12%. Roots of 2-year-old plants cut down at the time of harvest (end of August) contained 8·5–10·5% starch by mid-October, whereas, when the bines were not removed at harvest, the starch contents of roots rose to 16·5–17·5%. Varietal differences in starch accumulation were also encountered.

1642. Kříž, J.
Příspěvek k poznání kadeřavosti chmele. (**Report on the identification of curl in hops.**) [Russian, English and German summaries ½ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1957, **30**: 811-28, bibl. 15, illus.

Curl, which is a serious virus disease of hops in Czechoslovakia, reduces yields and brewing quality. Attempts to transmit the disease mechanically and by grafting, insects or soil were unsuccessful. Sets taken from heavily infected plants showed improved growth when planted in different soil. Magnesium applications corrected symptoms of curl and gave increased yields. Measures for reducing the spread of the disease are discussed.

1643. Jermoljev, E., and others.
Šetření o fysiologických odlišnostech u chmelových rostlin napadených kadeřavostí a vztazích této choroby k půdnímu chemismu. (**Studies on the physiology of hop plants infected with curl, and the relation of the disease to soil chemistry.**) [Russian, English and German summaries 1 p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1957, **30**: 829-48, bibl. 8.

Hop plants infected with curl showed increased enzyme activity and a lower respiration rate than healthy plants; they also had higher contents of dry weight, reducing sugars, nitrogenous compounds and growth-promoting substances. No differences in amino-acids were observed. Quantitative analyses showed differences in minor element contents between healthy and diseased plants. Analyses of soils in which infected and healthy plants were growing showed positive correlations between soil and plant contents of P, Mg and Ca. The most interesting differences between "healthy" and "diseased" soils, however, concerned Sr and Cr; "healthy" soils contained more Sr and less Cr than "diseased" soils.

1644. Hudson, J. R.
Further observations on the heavy metal content of hop plants in relation to nettlehead.
J. Inst. Brew., 1957, **63**: 488-90, bibl. 4.

Leaves from nettlehead-infected plants were found to have higher contents of Ni, Fe, Mo and V than had healthy leaves [see also *H.A.*, 27: 1682]. Nickel contents of diseased cones were also higher than those of healthy cones.—Brew. Ind. Res. Found., Nutfield.

1645. Petrlík, Z.
Výsledky pokusů s postřikem chmele proti peronospoře v roce 1955 a 1956. **(Results of spraying tests against hop downy mildew in 1955 and 1956.)** [Russian and English summaries ½ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1957, **30**: 861-72, bibl. 4, illus.

The most effective fungicide for protecting hops against *Pseudoperonospora humuli* was a copper oxychloride preparation, Kuprikol, a paste containing 30% copper, used at a concentration of 1%. Wettable powder forms of copper oxychloride were less effective. Copper oxide compounds may be used for protection until the period of cone formation. In these tests, however, Copper Sandoz (50% copper) used at 0·33–0·35% was less effective than Kuprikol. Organic fungicides cannot yet replace copper fungicides for control.

1646. Talboys, P. W.
The possible significance of toxic metabolites of *Verticillium albo-atrum* in the development of hop wilt symptoms.
Trans. Brit. mycol. Soc., 1957, **40**: 415-27, bibl. 34, illus.

Culture filtrates of *Verticillium albo-atrum* will induce desiccation and necrosis in hop shoots, but the intensity of this action bears no relation either to the pathogenicity of the fungal strain or to the wilt tolerance of the hop variety. Considering this in relation to evidence from earlier work with intervarietal graft complexes, it is suggested that, in a *determinative* phase of the host-parasite relationship, the interactions of the mechanisms which determine the degree of tolerance of the host and the pathogenicity of the fungus lead to the establishment of varying intensities of vascular invasion in the root system. In a secondary *expressive* phase, continued but sometimes restricted fungal activity results in development of visible symptoms, possibly through a toxigenic mechanism in which symptom intensity depends on toxin dosage and is related to the amount of mycelium present in the vascular system. [Author's summary.]—E. Malling Res. Stat.

1647. Koula, V., Taimr, L., and Kříž, J.
Systemické aerosoly v boji proti mšici chmelové (*Phorodon humuli* Schr.) a mšici makové (*Aphis fabae* Scop.). **(Systemic aerosols for the control of hop aphid and black bean aphid.)** [Russian, English and German summaries 1½ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1957, **30**: 873-914, bibl. 53, illus.

Aerosol solutions were prepared by dissolving various systemic insecticides in polymethylnaphthalene. Low volume applications by aeroplane of demeton or thiometon (275 g. active ingredient per ha.) were effective in controlling *Phorodon humuli*. The first application should be given at the first signs of aphid attack, followed by a second application, if necessary, 3–5 weeks later. Aqueous sprays of demeton (425 g. active ingredient per ha.) and OMPA [schradan] (574 g. a.i./ha.) were effective against the hop aphid for 3 weeks, while thiometon (340 g. a.i./ha.) was effective for 17 days. Watering the plants at the beginning of June with dimefox (2,250 g. a.i./ha.) was effective for 30 days. BHC and nicotine smokes produced by a stationary generator were not satisfactory, but smokes applied by a hand generator were very effective, and demeton applied in this way at 450 g. a.i./ha. showed the same residual activity as demeton aerial applications. Studies on the control of black bean aphids on sugar beet are also reported.

1648. Laws, E. Q., and Darling, H. S.
Treatment of hops with dimefox.
Nature, 1958, **181**: 498, bibl. 1.

Dimefox was applied to the soil under hop plants at 0·5 g. active ingredient per hill on May 31, and some plants received a second dose of 0·25 g. per hill on July 19. Leaf analyses showed that the dimefox was rapidly absorbed and translocated to all parts of the plant. The dimefox content of the plant remained steady for some weeks and then declined. Analyses of dried cones harvested 108 days after the single application showed them to contain 0·13 p.p.m. dimefox. The comparable figure for plants that had received 2 applications was 0·33 p.p.m. Neither of these residues is considered to be high enough to constitute a health hazard.—Dep. Govt. Chem., London, and Dep. Hop Res, Wye Coll.

1649. Pokorný, M.
Vliv různé doby řezu, zejména podzimního, na výnos chmele. **(The effect of time of cutting back the bines, especially in the autumn, on hop yields.)** [Russian, English and German summaries ½ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1957, **30**: 783-98, bibl. 7.

The extent to which cutting back the bines in the autumn affected yield in the next year varied with the height at which they were cut and with climatic conditions. Autumn cutting of the bines gave higher yields than spring cutting when the following season was relatively cold and short. Autumn cutting is especially recommended for plants after their first year's growth and for old and poorly-nourished hops. If bine cutting is left to the spring it should be complete before April 25.

1650. Zub, L.
Badania nad wpływem sposobów suszenia chmielu na jego wartość technologiczną jako surowca browarnianego. **(Studies on the effects of hop drying methods on the technical value of hops as a raw material for brewing.)** [Russian and English summaries ½ p. each.]
Roczn. Nauk rol., Ser. A, 1957, **76**: 157-67, bibl. 9.

Sun drying of hops resulted in lower quality than when hops were dried under cover. It is suggested that hops may be dried satisfactorily in a tobacco drier, at 38–42° C., with ventilators kept open throughout the drying period.

1651. Askew, H. O., and Monk, R. J.
Physical and chemical changes in hop cones during drying.
N.Z. J. Sci. Tech., Sect. B, 1957, **38**: 943-54, bibl. 8.

Heated air in passing through a bed of hops decreases in temperature and rises in moisture content, especially in the early stages of drying. But with air at 140° F. the humidity of the air in the bed of hops rapidly falls and the temperature of the hops rises slowly at first and more rapidly later. When drying is completed, there is relatively little difference between the temperatures of the ingoing and outgoing air. Rates of loss of water remain constant for some hours during drying, especially when the relatively low temperatures of 110° to 120° F. are used. There is a logarithmic relation between loss of water and time. There was no loss of nitrogen, no change in the proportion of protein-nitrogen, and no loss of dry matter during curing. [Authors' summary. See also *H.A.*, 27: 2652.]—Cawthron Inst., Nelson.

1652. Howard, G. A., and Slater, C. A.
Evaluation of hops. VII. Composition of the essential oil of hops.
J. Inst. Brew., 1957, **63**: 491-506, bibl. 16, illus.

Analysis of the essential oils from a large number of hop samples has shown that the oil content is affected by numerous factors, including the variety of hop, the conditions during its growth and the treatment received by cones after picking. It is confirmed that the proportions of myrcene and humulene in the hydrocarbon fraction are related inversely one to the other, and can be correlated with the composition of the α acids and of the β acids present in the hop resins. The biosynthetic implications of these findings are discussed. [From authors' abstract. For parts V and VI see *H.A.*, 27: 2647 and 2650.]—Brew. Ind. Res. Found., Nutfield.

Insecticidal plants.

(*See also* 1346, 1672e.)

1653. Rao, D. S.
The insecticidal property of petals of several common plants in India.
Econ. Bot., 1957, **11**: 274-6, bibl. 1.

Kerosene extracts of the petals of 13 common flowering plants and shrubs were tested against the rice weevil. Some appeared to be better than 11% pyrethrum extract.

1654. Cabo Torres, J., Pardo García, M. del P., and Nosti Nava, J.
Sobre el contenido en piretrinas de pelitres cultivados. Nota III. Nuevos datos acerca de la influencia del nitrosulfato amónico como fertilizante. (**The pyrethrins content of cultivated pellitory of Spain. III. Further data on the effect of ammonium nitro-sulphate as a fertilizer.**)
Farmacognosia, 1957, **17**: 377-80, bibl. 2.

Yields of irrigated *Anacyclus pyrethrum* flower heads decreased in the first, and increased in the second, year of application of ammonium nitro-sulphate. The fertilizer treatment, however, had no effect on the content of pyrethrins I or II. [See also *H.A.*, 27: 669d, e.]

1655. Kennard, W. C.
Studies on growth, toxicity, and flowering of the insecticidal plant, *Tephrosia vogelii* Hook f.
Diss. Abstr., 1957, **17**: 209, being *Publ.* 19,307 of 90 pp.

In cultural experiments *Tephrosia vogelii* plants showed marked growth responses to differential fertilizer, mulch, and sunlight treatments. The highest yields of plant material were obtained from fertilized, non-mulched plants grown under 75% or full sunlight conditions. Leaf contents of toxic substances increased gradually with age of the plant. At harvest, 4 months after planting in the field, the leaves contained 0·5% rotenone and 1·33% total rotenoids; stem tissue averaged 0·3% rotenoids, while roots contained only traces of rotenoids. Fertilizer, mulch and partial shade treatments did not affect leaf or stem contents of toxic principles. Rotenoid contents were not affected by altitude (up to 2,400 ft.) or soil type. Under natural conditions large-bodied insects were necessary for pollination. Chlorophenoxyacetic acid and indolebutyric acid, applied in lanolin to the flower perianths, were found to improve fruit set. Sprays of N-meta tolyl were not effective. It is concluded that the culture of *Tephrosia vogelii* as a source of rotenone offers several advantages over the present sources of this insecticide.

Rubber plants.

(*See also* 1672z.)

1656. Minshall, W. H.
Rubber and resin content of native and introduced plants of Canada.
[*Mimeo Publ.*] *Canada Dep. Agric., Ottawa*, [undated, received 1957], pp. 53, bibl. 5.

Samples of over 300 species were collected throughout Canada in 1942 and 1943 and were analysed for resin and rubber contents. Results of the analyses are tabulated, including in some cases the values obtained for the different plant parts. No hitherto unknown species of outstanding value as a rubber plant was discovered in this survey. Genera containing species with a benzene extract (rubber content) in excess of 1% of dry weight were: *Apocynum*, *Asclepias*, *Eucommia*, *Euonymus*, *Euphorbia*, *Lonicera*, *Parthenium* and *Solidago*. Genera containing species with an acetone extract (resin content) in excess of 20% of dry weight included: *Acer*, *Apocynum*, *Arctostaphylos*, *Asclepias*, *Baptisia*, *Betula*, *Campanula*, *Chrysothamnus*, *Comptonia*, *Cotinus*, *Daucus*, *Euonymus*, *Eupatorium*, *Euphorbia*, *Grindelia*, *Lonicera*, *Rhus*, *Solidago* and *Tragopogon*.

1657. Habejšvili, V. V.
Alteration of male trees of *Eucommia* into female ones by budding. [Russian.]
Agrobiologija, 1957, No. 3, pp. 149-50.

Male trees of *Eucommia* were cut back during dormancy, thus inducing the formation of new shoots into which the buds from female trees were inserted in July–August. Shield budding with the slip of wood removed gave a high percentage take. The budded plants were required to produce seed, and the alteration of their sex had practically no effect on the gutta content of the leaves.

1658. Nizkovskaja, E. K.
The formation of organs containing and conducting gutta latex in *Eucommia* in relation to the age of the plant. [Russian.]
Uč. zap. Tadžiksk. Un-ta, 1955, **6**: 57-66, from *Ref. Ž.* (*Biol.*), 1957, No. 15, Abstr. 64,996.

Histological and biochemical studies on *Eucommia* at the Tadžik Botanical Institute have shown that the number and capacity of latex vessels increased with the growth of axial organs, fruits and leaves. The maximum number, however, was not found in the lowest (oldest) leaves, but in the middle tier of leaves, indicating that the position of the leaves on the stem has a greater effect on the formation of latex vessels than age. The gutta and resin contents of the leaves increased up to leaf fall, from which it is assumed that gutta is not utilized by the plant.

1659. (de Rafols, W.)
Sección de mejora del aprovechamiento de productos agrícolas. **(Section for improvement of utilization of agricultural products.)**
Mem. Trab. realiz. 1955-56 Inst. nac. Invest. agron., Madrid, 1957, pp. 50-65, 104.

Kok-saghyz of Swedish origin has given promising results in the provinces of León and Granada in Spain. The best method of sowing was in continuous rows 25 cm. apart. Good results were also given by 15 cm. strips, 35 cm. apart, and by humus-filled holes 25 cm. apart in rows spaced at 35 cm. Of numerous NPK combinations tested, that tentatively recommended, in kg. per ha., is N 200, P 400, K 100. Sodium arsenite was more economical than potassium cyanate or a proprietary weed-killer for removing tops, but its effects on the fermentation of the roots may make it unsatisfactory. Numerous roots and deep lobing of leaves were often associated with a high rubber content, which was sometimes more than 30%. Seed-harvesting machines are mentioned. Non-irrigated cultivation in Valencia yielded 4,172 kg. of roots per ha.

Seed oils.

(*See also* 1672g, q, v-x, 1673g, k, 1840f.)

1660. Li, D.-S.
Camellia semiserrata. [Chinese.]
Čžungo lin'-e, 1956, No. 1, pp. 33-6, from *Ref. Ž.* (*Biol.*), 1957, No. 14, Abstr. 60,858.

Camellia semiserrata growing wild and cultivated in the Kwantung province, S.E. China, is closely related to the tea-oil plant (*Thea oleosa*). Optimum conditions for its growth are a temperature range of 2° to 38° C., an annual rainfall of 1,700–1,800 mm. and 136–142 rainy days. The physical and chemical properties, including oil content, of the 2 species are compared.

1661. Lane, E. V.
***Piqui-á*—potential source of vegetable oil for an oil-starving world.**
Econ. Bot., 1957, **11**: 187-207, illus.

An account is given of the efforts of Sir Henry Wickham and others to establish *Caryocar villosum*, an edible-oil bearing tree from Brazil, as a plantation crop in Malaya. On a moisture-free basis the pericarp contains about 72% oil and the kernel about 61%. The composition of the fatty acids is tabulated.

1662. Fazekaş, I., and others.
Cercetări asupra nutritei suplimentare extraradiculare la ricin in anii 1953–1955. **(Studies on the foliar nutrition of castor bean plants in 1953-1955.)** [English and Russian summaries.]
Probl. agric. 1956, **8**(9): 44-54, from *Ref. Ž.* (*Biol.*), No. 13, Abstr. 55,708.

Solutions of N, P and K alone and in combination were applied to castor plants in Rumania. In years of normal rainfall the best results were obtained by spraying with PK (24 kg. superphosphate+40 kg. K_2CO_3 in 2,000 l. per ha.) which gave 21–61% higher yields than the controls. Superphosphate increased yields by 19%. In drought years spraying with K produced the best results, giving 29–61% yield increases. N fertilizers at 24 kg. per ha. were ineffective. PK also induced even ripening and increased the oil content of the seed by 3–4%. Spraying should be started soon after the appearance of the first inflorescence and should be repeated at least once about 3 weeks later.

1663. Gupta, A. S., and Chakrabarty, M. M.
Studies on the seed fat composition of desert plants. Pt. I. The component fatty acids of *Gynandropsis pentaphylla* seed fat. (N.O. Capparidaceae.)
Sci. and Cult., 1957, **23**: 306-7, bibl. 2.

Seeds of *G. pentaphylla*, collected in a desert area, yielded 17·6% of a dark-coloured oil with a high acid value. The composition of the mixed fatty acids, which formed 3 fractions, is tabulated. Although the yield of oil is rather low, the possibility of using it for the edible fat and soap industries should not be excluded.—Birla Coll., Pilani, and Calcutta Univ.

1664. Prokof'ev, A. A., and Novickaja, G. V.
Lipase activity and fat accumulation in flax and poppy seeds. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1957, **116**: 273-6, bibl. 10.

In young seeds the rates of both lipase activity and fat accumulation were low. They rapidly increased during development and fell again during ripening. In flax seed the maximum rates of lipase activity and fat accumulation occurred simultaneously, but in poppy seed the maximum rate of fat accumulation preceded that of lipase activity by several days.

Tannin plants.

1665. Bear, J. E., and Sievers, A. F.
Sumac, its collection and culture as a source of tannin.
Prod. Res. Rep. U.S. Dep. Agric. **8**, 1957, pp. 14, bibl. 1, illus.

The collection and utilization of wild sumac from *Rhus copallina*, *R. glabra* and *R. typhina* are described. Observations from an experimental planting at Beltsville are given. In propagation the best results were obtained by raising seedlings in a nursery bed and transplanting them after 1 year. Direct seeding was not a reliable method, and propagation by root cuttings also frequently resulted in poor stands. The rows were cultivated during the first year and in the following years weeds were cut down by a mower. Harvesting began in the second year, and over 3 seasons 1,490 lb. of dried leaf were obtained, but yields showed a decline from year to year. Methods of drying and preparation for market are described, and production costs are summarized.

1666. Wattle Research Institute, Pietermaritzburg.
***Report for 1956-1957*,** 1957, pp. 33.

A review of work in progress includes reports on the following: *Silviculture:* various weed control methods did not affect the growth of 2-year-old trees, but mowing has proved to be the cheapest method; oats as an intercrop were economically satisfactory and did not affect wattle growth adversely; a 3-row intercrop of swedes probably had adverse effects on tree growth. *Genetics and plant breeding:* pinnule shedding is thought to be of genetic origin; significant differences in gummosis attack between families have been observed; tree diameter was shown to be an unreliable guide to tannin content; propagation by root cuttings has not been satisfactory; tetraploid trees were more heavily attacked by bagworm than were diploid trees. *Chemistry:* lime and superphosphate applications have again increased yields at all sites; non-tan percentages in bark decreased with increasing rainfall; sucrose, fructose and glucose have been detected in the non-tan fraction. *Entomology:* aerial and commercial spraying and biological control of wattle bagworm are described. *Biometry:* methods for sampling wattle bark are being studied. *Papers* on the fungi and insects found in wattle plantations are included.

1667. Vail, J. W., Calton, W. E., and Strang, R. M.
Dieback of wattle—a boron deficiency.
E. Afr. agric. J., 1957, **23**: 100-3, bibl. 5.

An investigation in southern Tanganyika has indicated that a die-back of black wattle (*Acacia mollissima*), in which cambial necrosis is followed by withering and death of the apices, is caused by a deficiency of boron and may be controlled by boron spray treatment or applications to the soil.—Tanganyika Wattle Estates (C.D.C.), Njombe.

Sundry plants.

(*See also* 1672n, 1673e, n, 1908.)

1668. Kennard, W. C., and Freyre, R. H.
The edibility of shoots of some bamboos growing in Puerto Rico.
Econ. Bot., 1957, **11**: 235-43, bibl. 8, illus.

The authors weighed and tasted, raw and cooked, the shoots from 27 species and types of bamboo. Canning qualities were also considered. Seven species yielded shoots of good canning quality and of these *Bambusa polymorpha* and *Dendrocalamus membranaceous* were the best. *B. vulgaris*, the only variety abundant in Puerto Rico could be used for home consumption and for commercial canning until plantings of more desirable species have been established.—Fed. Exp. Stat., Mayaguez, P.R.

1669. McClure, F. A.
Bamboos of the genus *Phyllostachys* under cultivation in the United States.
Agric. Handb. U.S. Dep. Agric. **114**, 1957, pp. 69, bibl. 13, illus.

Brief notes are given on the economic importance and growth habit of bamboos. The main part of the handbook provides a key for the field identification, in the absence of flowers or fruits, of the 34 species and 10 cultivars of *Phyllostachys* that have been successfully introduced into the United States. [See also *H.A.*, 27: 670a.]

1670. Jacobs, A., and Maton, A.
La rationalisation de l'industrie de l'osier. **(Improvements in the willow industry.)** [English and German summaries 4 lines each.]
Rev. Agric. Brux., 1957, **10**: 1082-99, illus.

The preparation of basket willows for market in Belgium is described. Three kinds are prepared, viz. brown, white and chemically bleached. Artificial drying by hot air has given improved production, with only slight differences in colour from willows dried naturally.—Stat. Génie Rural de l'État, Lemberge.

1671. Forestry Commission (Bryce, J., and others).
Cultivation of the cricket bat willow.
Bull. For. Commiss. **17**, 2nd edition 1958, pp. 33, bibl. 35, illus., H.M.S.O. 5s.

This up-to-date and attractively produced bulletin contains information on conditions suitable for the cultivation of the cricket bat willow (*Salix alba* var. *caerulea*), its propagation, planting and maintenance, damage caused by various agencies and the character and uses of its timber. There is also a chapter on the systemic botany of the species and its allies, which includes a key to their identification.

Noted.

1672.

a Abraham, P.
Have a few spice trees in your garden.
Indian Fmg, 1957, 7(8): 28-31, illus.
Notes on growing cloves and nutmegs.

b Abraham, P.
Karana is excellent as shade tree for cardamom.
Indian Fmg, 1957, 7(9): 14-16, illus.
Vernonia monocis (Compositeae), a 30-40 ft. evergreen in Travancore.

c Anon.
Dominica's orchid crop.
Windward Is. Annual, 1957-58, 1957, pp. 48-51, illus.
A popular account of vanilla growing.

d Ataev, A. A.
Alkaloid yielding plants of northern Tadžikistan. [Russian.]
Tr. AN TadžSSR, Otd. estestv. N., 1955, **36**: 83-9, from *Ref. Ž.* (*Biol.*), 1957, No. 15, Abstr. 65,126.
Of 314 species investigated 87 contained alkaloids.

e Beroza, M.
A review of some fundamental studies on pyrethrum synergists in sesame oil.
Pyreth. Post, 1957, **4**(2): 9-10, bibl. 17.

f Bevan, C. W. L., and Hirst, J.
A convulsant alkaloid of *Dioscorea dumetorum*.
Chem. Ind. Lond., 1958, No. 4, p. 103, bibl. 5.
Dihydro-dioscorine present in fresh tubers of a West African species.

g Bharucha, F. R., and Joshi, G. V.
A note on nitrogenous constituents of *Ricinus communis* Linn.
Sci. and Cult., 1957, **23**: 307-8, bibl. 10.
Total N and amino acids in roots, young and old stems and young and old leaves.

h Brands, L. E.
Safflower growing on the Darling Downs.
Qd agric. J., 1957, **83**: 605-8, illus.
Notes on culture in Queensland.

i Candussio, R.
Le piante del curaro. **(Curare plants.)**
Riv. Agric. subtrop. trop., 1957, **51**: 369-84, bibl. 52, illus.
Species of *Strychnos*, *Chondrodendron*, *Abuta*, *Telitoxicum*, *Sciadotenia* and *Elissarrhenia*; a review.

j Čech, M., and Pozděna, J.
Příspěvek k možnosti mechanického přenosu kadavosteři a nakažlivé neplodnosti chmele. **(Report on the mechanical transmission of curl and infectious sterility in hops.)** [Russian, English and German summaries ½ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1957, **30**: 849-54, bibl. 12.
By inoculations with modified or partially purified juices.

k Chiurdoglu, G., Copet, A., and Tullen, P.
Contribution à l'étude des composés sesquiterpéniques des huiles essentielles du Congo belge. Étude structurale du tricyclovétivène de l'essence du vétiver du Congo belge. **(Contribution to the study of the sesquiterpenes of the essential oils of the Belgian Congo. A structural study of tricyclovetivene from vetiver oil of the Belgian Congo.** [Flemish summary ¾ p.]
Bull. agric. Congo belge, 1957, **48**: 1503-13, bibl. 13.

l Čikalov, P. M.
Methods of planting *Ocimum gratissimum*. [Russian.]
Krat. Očtet o naučn.-issled. Rabote Vses. n.-i. In-ta maslič. i efiromasl. Kul'tur VASHNIL za 1955, Krasnodar, 1956, pp. 223-6, from *Ref. Ž. (Biol.)*, 1957, No. 13, Abstr. 55,885.
Two plants per site, 60×60 cm. recommended.

m Cole, J. R.
A preliminary phytochemical investigation of *Digitalis lutea* first year growth.
Diss. Abstr., 1957, **17**: 1474-5, being *Publ.* 21,239 of 107 pp.
Chemistry of fresh leaf extracts prepared by 2 methods.

n Creech, J. L.
Hardiness of the running bamboos.
Nat. hort. Mag., 1957, **36**: 334-9, illus.
Response of various species to −10° F. in collection at Glenn Dale, Md.

o Delvaux, A.
Répartition des alcaloïdes dans le quinquina (*Cinchona ledgeriana*) au Kivu. **(The distribution of alkaloids in cinchona at Kivu.)** [Flemish summary 1½ pp.]
Bull. agric. Congo belge, 1957, **48**: 1137-54, bibl. 11.
According to age, in roots, trunks, branches and leaves.

p Dickel, D. F., and others.
The alkaloids of *Tabernanthe iboga*. Part III. Isolation studies.
J. Amer. chem. Soc., 1958, **80**: 123-5, bibl. 7.
Twelve alkaloids isolated from roots.

q Frimmel, F.
Vyšlechtění nové keříčkovité bezeslupkaté tykve. **(Development of a new bush pumpkin having seed without an integument.)** [Russian summary ½ p.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1957, **30**: 633-44, bibl. 12, illus.
A new type of oil-seed pumpkin produced by hybridization.

r Handa, K. L., Chopra, I. C., and Sobti, S. N.
Aromatic plant resources of Jammu and Kashmir.
J. sci. industr. Res., India, 1957, Vol. **16A**, No. 5, Suppl. pp. 1-28, bibl. 26.
Short notes on 66 species, with data on yields and characteristics of 20 oils.

s Hastie, E. L.
Preparing ginger "seed" for planting.
Qd agric. J., 1957, **83**: 427-30, illus.
Preparation, storage and planting of "seed" rhizomes.

t King, L. J.
A unique reported use for the fruit of *Semecarpus anacardium* L.f. (Anacardiaceae) in ancient Arabian and Indian medicine.
Econ. Bot., 1957, **11**: 263-6, bibl. 33.
Can the fruit, used by the ancients to improve memory, be utilized in modern psychopharmacology?

u Klapal, I.
Zkrmování zelené chmeliny. **(Green hop bines as fodder.)** [Russian and English summaries ¼ p. each.]
Sborn. čsl. Akad. zeméd. Véd, Rostl. Výroba, 1957, **30**: 955-8, bibl. 2.
For cows.

v Kornberg, H. L., and Beevers, H.
The glyoxylate cycle as a stage in the conversion of fat to carbohydrate in castor beans.
Biochim. biophys. Acta, 1957, **26**: 531-7, bibl. 22.
During germination [see also *H.A.*, 27: 2662].

w Krishnamurthi, M. N.
Literature review on oils and fats, 1955.
[*Publ.*] *C.S.I.R. New Delhi*, 1957, pp. 40.
Some 500 papers on all aspects reviewed.

x Leete, E., and Leitz, F. H. B.
Biogenesis of ricinine.
Chem. Ind. Lond., 1957, No. 48, p. 1572, bibl. 5.
In castor bean seedlings, nicotinic acid being a direct precursor.

y Malayan Union Department of Agriculture.
Manila hemp *(Musa textilis).*
Planter, Kuala Lumpur, 1957, **33**: 718-21, bibl. 2.
Varieties and culture in Malaya.

z Marzocca, A., and Caso, O.
Tratamiento de semillas de kok-saghyz con rayos ultravioletas. (**Treatment of kok-saghyz seeds with ultra-violet rays.**) [English summary ½ p.]
Rev. Invest. agric. B. Aires, 1957, **11**: 227-45, bibl. 31.
For a preliminary account see *H.A.*, 27: 3701.

1673.

a Meneret, G., and Svinareff, —.
Les houblons de la récolte 1955. (**The 1955 hop crop.**)
Reprinted from *Brasserie*, [undated], No. 119, pp. 11.
Production, cone composition and quality of hops from Alsace, Lorraine, Burgundy and Flanders.

b Mukerji, B.
Indigenous Indian drugs used in the treatment of diabetes.
J. sci. industr. Res., India, 1957, Vol. **16A**, No. 10, Suppl. pp. 1-18, bibl. 124, illus.
A review, describing 11 spp. and their chemistry, pharmacology and therapeutic uses.

c Neirinckx, G., and Struelens, H.
Geranium-oliën uit Belgisch-Congo. (**Geranium oils from the Belgian Congo.**) [French summary 5 lines.]
Bull. agric. Congo belge, 1957, **48**: 1123-35, bibl. 19.
Amounts obtained by distillation about 2% less than found by analysis in all samples.

d Pozděna, J., and Čech, M.
K problematice serologického zjišťování nakažlivé neplodnosti a kadeřavosti chmele. (**The problem of serological identification of infectious sterility and curl of hops.**) [Russian, English and German summaries ⅓ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1957, **30**: 855-60, bibl. 22.
Possible for curl but not for infectious sterility.

e Savos'kin, I. P.
Urginea maritima. [Russian.]
Priroda, 1957, **46**(8): 92-3, illus.
Notes on red and white forms of squill and their active principle.

f Schick, E.-R., and Reimann-Philipp, R.
Die Züchtung von Heilpflanzen. (**The breeding of medicinal plants.**)
Züchter, 1957, **27**: 300-32, bibl. 173.
A review.

g Sethi, A. S., and Kartha, A. R. S.
An improved method for direct estimation of free tocopherol in small quantities of oilseeds.
Indian J. agric. Sci., 1957, **27**: 49-72, bibl. 7.

h Sharp, M. A., and Reddy, N. S.
It's easier to work with the Bark Remover.
Indian Fmg, 1957, **7**(8): 18, illus.
Describes a machine using steel chain beaters to remove cinchona bark.

i Slabyhoudek, K.
Odrůdy úštěckého chmele. (**Úštěk hop varieties.**) [Russian, English and German summaries ¼ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1957, **30**: 945-54, bibl. 5, illus.
Selection and trials of new varieties; cone characters are illustrated.

j Soudek, J.
Kolorimetrické stanovení chmelových tříslovin. (**Colorimetric determination of hop tannins.**) [Russian, English and German summaries ¼ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1957, **30**: 937-44, bibl. 6, illus.
The use of a photometer in the de Clerck method.

k Svechnikova, I. N.
Les transformations de l'amidon dans les tissus des oléagineux. (**Starch transformations in the tissues of oil seeds.**)
Oléagineux, 1957, **12**: 735-40, bibl. 19, illus.
Studies include oil accumulation in opium poppy and other seeds.

l Trzebiński, J., and Gniłka, W.
Metody szybkiego oznaczania inuliny w korzeniach cykorii. (**Rapid methods for determining the inulin content of chicory roots.**) [English and Russian summaries ½ p. each.]
Roczn. Nauk rol., Ser. A, 1957, **74**: 629-41, bibl. 6.
Polarimetric and colorimetric determinations.

m U.S. Department of Agriculture.
Black and white pepper: world production and trade.
Foreign Agric. Circ. U.S. Dep. Agric. **FTEA 4-57**, 1957, pp. 14.
Production from 1935 to 1956 examined.

n Viado, G. B., and Ylagan, M. M.
Starch, total sugar and moisture contents of *Bambusa vulgaris* Schrad. in relation to infestation by *Dinoderus minutus* Fabr.
Philipp. Agric., 1957, **41**: 215-22, bibl. 7.
There was no apparent relationship.

o ZUB, L.
Wpływ temperatury suszenia chmielu na zawartośc żywic miękkich. **(The influence of hop drying temperature on the soft resin content.)**
Przemysł Spoż., 1957, No. 1, pp. 31-2, from *Polish tech. Abstr.*, 1957, **4**(28), No. 5095.
Adverse effects of temperatures exceeding 50° C. recorded.

FLORICULTURE.

General.

(*See also* 1016, 1035, 1081c, 1341-1345, 1785a, o, y, z, 1786d, e, m, o, s, 2003, 2024, 2027, 2028.)

1674. INSTITUTE OF PARK ADMINISTRATION.
Report of the First International Congress in Public Park Administration, 1957,
Inst. Park Admin., Reading, 1957, pp. 172.

The First International Congress was attended by representatives of 27 countries, and 32 papers, most of which were read at the congress, are given here. These cover problems and general aspects of roadside planting, design of parks and their cultural, educational and recreational value, efficiency methods and staff training, and the culture and maintenance of grass areas.

1675. FJÄDERHANE, A. M., AND ARVIDSSON, L.
Arbetsstudier i trädgårdsodlingen. **(Time studies in horticulture.)** [List of contents in English.]
Medd. Alnarpsinst. trädgårdsekon. Byrån **26**, 1957, pp. 51, illus.

The latest investigations reported in this series, carried out by the Bureau of Horticultural Economics, Alnarp, include time and motion studies on: the potting of several flower crops; miscellaneous glasshouse work on vegetables; the propagation and planting of roses; packing nursery plants; and the planting out of cauliflowers and various flower crops. [For other studies see *H.A.*, 27: 4 and 71 and earlier.]

1676. FLOOR, J.
Verslag van proeven met stekken onder waterverneveling. **(Report of experiments with cuttings under mist propagation.)** [English summary ¾ p.]
Meded. Inst. Vered. Tuinbouwgew. **118**, 1957, pp. 28, bibl. 30, illus.

Some equipment for mist propagation which has been developed at the I.V.T., Wageningen, is described. This includes a deflector-type nozzle, a photoelectric timer, cutting boxes with bottoms of saran gauze for good drainage, and a plastic greenhouse designed for mist propagation. A method of mist control has also been developed which allows little mist to be released until the optimal leaf temperature is reached, after which continuous mist is given. Results of propagating fruit trees, roadside trees and ornamentals are tabulated. The best results with M.IX cuttings were obtained with 0·5% IBA treatment and thermostatically-controlled mist. M.M.104, M.M.111, and F 12/1 rooted easily. A 2% concentration of IBA was used in propagating roadside trees. Cuttings of maples and limes generally rooted well; good rooting was also obtained with *Betula nigra*, but almost no rooting was obtained with *B. pendula*. *Rosa hugonis* cuttings treated with 0·5% or 2% IBA were kept under intermittent mist, but results were poor. Cuttings of *Croton* and *Euphorbia fulgens* rooted well in the humidifier. [For earlier results see *H.A.*, 27: 726.]

1677. KNIGHT, F. P., BEAN, A. G. M., AND HANGER, F. E. W.
Mist technique propagation.
J. roy. hort. Soc., 1957, **82**: 458-74, bibl. 4 and in text, illus.

The article reviews the development of mist techniques, and describes work at the N.I.A.E., Silsoe, and the R.H.S. Gardens, Wisley. Results obtained with cuttings of various varieties of *Viburnum*, *Syringa*, chrysanthemum, dahlia and carnation are tabulated.

1678. CARPENTER, W. J., AND WILLIS, W. W.
Comparisons of low pressure mist, atomized fog, and evaporative-fan-and-pad systems for greenhouse cooling and plant response.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 490-500, bibl. 5, illus.

An evaporative cooling method, employing aspen excelsior padding and exhaust fans, was effective in reducing greenhouse summer temperatures 10 to 16° F. below prevailing outside temperatures and 17 to 21° F. below normal greenhouse temperatures. This method gave a greater reduction in temperature than cooling systems employing either Binks' high-pressure fog nozzles or Monarch 80 mist nozzles. Similar R.H. levels, 60 to 75%, prevailed in the fog-cooled and evaporative cooled greenhouse sections except during the afternoon hours on days with official temperatures in excess of 100° F. Then the R.H. in the fog-cooled greenhouse was reduced to 56% compared with 67% for the evaporative-cooled section. Humidities in the mist-cooled greenhouse were lower than in the other cooled sections but higher than those in the uncooled greenhouse. Statistical analyses of data pertaining to plant height and fresh weight in chrysanthemums, snapdragons and carnations showed that plant growth in the section cooled by the evaporative cooling system was significantly superior to that of plants in the other greenhouse sections. The quality of plant growth in the section cooled by Binks' fog nozzles was significantly better than that in the mist and uncooled greenhouses. The quality of plant growth in the section cooled by Monarch 80 mist nozzles was either superior to, or as good as, that of plants in the uncooled greenhouse. The mortality of rooted carnation cuttings, transplanted directly from the propagation bench in the greenhouse, was considerably higher in the uncooled greenhouse than it was in the cooled greenhouses

Better branched carnation plants developed from the April and May propagations grown in the cooled houses than in the uncooled greenhouse. [From authors' summary.]—Kansas St. Coll., Manhattan.

1679. Meijer, G., and van der Veen, R.
Wavelength dependence on photoperiodic responses.
Acta bot. neerl., 1957, **6**: 429-33, bibl. 5.

Short-day treatment for *Kalanchoë*, *Salvia* and *Larix* plants was effective in inducing flowering irrespective of the light intensity used. With *Hyoscyamus* and *Salvia* a long-day effect was only obtained when the plants received blue light during the main light period and red or green light during the night break.—N. V. Philips' Gloeilampenfabrieken, Eindhoven.

1680. Penningsfeld, F.
Torf als Kulturerde im Blumen- und Zierpflanzenbau. **(Peat as a culture medium for flowers and ornamental plants.)**
Reprinted from *Mitt. Moor-u. Torfwirtsch.*, [1957?], Vol. 4, Heft 1-4, pp. 11, bibl. 3, illus.

The article is a brief summary of the observations made and of the techniques developed in 8 years' studies on the uses of peat in horticulture, which showed that the material is an excellent culture medium for pot plants [see also *H.A.*, 25: 4265]. The following are some of the advantages of peat over soil: It is free from disease, stimulates growth, in particular root growth, promotes flowering and enhances the availability of both minor elements and phosphates. Plants grown successfully in peat culture include azaleas, ericas, camellias, gardenias, hydrangeas, cyclamen and many hot-house plants. Another technique described is to embed potted plants grown in soil in a layer of peat which has been supplied with nutrients. These reach the roots by diffusion through the porous walls of the pot. The properties required of the peat and the nutrition of plants raised in this material are also discussed.—Staatl. Lehr- u. ForschAnst. f. Gartenbau, Weihenstephan.

1681. Sciaroni, R. H., and Lunt, O. R.
Sewage sludges for agriculture.
Calif. Agric., 1957, **11**(11): 13, 15-16.

The chemical and physical properties of sewage sludges processed in different ways and the problem of their toxicity to plants, which sometimes follows steam sterilization, are discussed. By a new process used at Redwood City, Calif., sludge is digested by the usual anaerobic method for 60-90 days and then pumped into drying basins onto filtering layers of peat, wood shavings, etc. After drying for a short period it is rototilled, then more sludge is added and this is in turn rototilled 2 or 3 weeks later. The final sludge-peat or sludge-wood shavings mixture, which has good physical properties, produced an excellent crop of greenhouse chrysanthemums when added to fine sand at 50% by volume without the addition of any fertilizers. When used in the same way for roses, but steam-sterilized, some toxic effects resulted. The mixture added at 25% by volume has been successfully used for carnation, camellia, juniper, daphne and lemon plants.—Univ. Calif., Los Angeles.

1682. Soukup, J., and Matouš, J.
Příspěvek k seznání účinnosti listovek a jejich vodních výluhů na květiny. **(A study on the effect of leaf-mould and of its water-soluble extract on flowers.)** [Russian and English summaries ½ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1957, **30**: 1197-208, bibl. 113, illus.

Primula obconica and *Begonia tuberhybrida* made better growth in older leaf-moulds than in younger leaf-moulds, but when they were watered with extracts from the leaf-moulds the extracts of the younger leaf-moulds gave the better results. Varied effects of leaf-mould types on inflorescence development were observed. The best leaf-moulds were of mixed origin and 3 years old. Oak leaf-mould gave better results than beech leaf-mould, and chestnut leaf-mould was the least satisfactory.

1683. Stark, C.
Zur phytotoxischen Wirksamkeit des Chlorpikrin. **(On the phytotoxic action of chloropicrin.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1958, **10**: 23-5, bibl. 4, illus.

A study was made of the effect on flower crops and vegetable seedlings of chloropicrin gas escaping from soil treated in the vicinity of a glasshouse. Exposure to the gas at concentrations beyond the threshold value—5 mg. to 40 mg./cu. m. according to species—caused leaf necrosis, especially in the older leaves. Particular care is needed when plants are in direct sunlight, as this increases the phytotoxicity of the chemical.—Staatsinst. angew. Bot., Hamburg.

1684. Hudek, H. J.
Moist-pack flower shipping.
Bull. Colo. agric. Exp. Stat., **497-S**, 1957, pp. 14, illus.

A new, stronger, more economical container has been designed and tested for transporting flowers. It has the following features: (1) the lid of the corrugated cardboard case is fully telescopic and the case is thus well insulated; (2) corrugated board inserts in the box and the lid wedge the flowers in a horizontal position and prevent movement and breakage; (3) the flowers are wrapped in polythene film and keep fresh without water or ice getting on the box and causing it to weaken; (4) the outer surface of the lid is white, thus giving lower temperatures inside the case than with normal cardboard. Methods of packing carnations in both the old and new containers are illustrated. Problems requiring study are enumerated. J.R.L.

Annual and herbaceous plants.

(*See also* 1323, 1785h, k, m, p, s, t, w, x, 1786k.)

1685. Jeff, A. E.
Other flower crops.
A.R. Rosewarne exp. Hort. Stat. 1956, 1957, pp. 42-5.

Violets: Chlorobenzilate and Chlorocide both gave fairly good control of red spider mite but caused some leaf scorch. A *Chrysanthemum* variety trial and a *Zinnia* spacing and stopping trial are described briefly. *Manurial trials:* dung produced the best growth of violets, calendulas and polyanthus.

1686. Bolhovskih, Z. V.
Anatomical and physiological investigations on some ornamental plants in relation to winter hardiness. [Russian.]
Tr. Botan. In-ta AN SSSR, 1955, No. 10, pp. 139-93, bibl. 202, from *Ref. Ž.* (*Biol.*), 1957, No. 15, Abstr. 64,568.

Four species of *Campanula* and 2 of *Primula*, having very different degrees of winter hardiness, were grown under cover and in the open during the autumn-winter-spring period in Leningrad. Determinations were made on their ascorbic acid, carbohydrate and chlorophyll contents, the oxidizing and iodine reducing activity of their tissues and their respiration. Anatomical characteristics such as the cell membrane and the conducting system were also studied. The results obtained indicate that the criterion of hardiness in the species studied was not the total content of carbohydrates but their metabolism, which depended on seasonal changes and meteorological conditions. Furthermore the hardier species had higher ascorbic acid contents and higher iodine reducing and oxidizing activities. These species were also distinguished by well expressed xerophytic characters such as greater thickness of the leaf blade and more marked development of the conductive system.

1687. Orian, G.
Une maladie de quelques plantes ornementales causée par un nématode foliaire. **(A disease of certain ornamental plants caused by a foliar nematode.)**
Rev. agric. sucr. Maurice, 1957, **36**: 261-4, bibl. 7, illus.

Zinnia, dahlia and chrysanthemum leaves were damaged in Mauritius by a nematode thought to be *Aphelenchoides ritzema-bosi*. The symptoms are described and control measures suggested.

1688. Kohl, H. C., Kofranek, A. M., and Lunt, O. R.
Response of China asters to high salt and boron concentration.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 437-41, bibl. 5, illus.

Asters were shown to be moderately sensitive to salinity caused by sodium and calcium chlorides, and also to excess B. Excess salts decreased plant height and flower size, but excess B did not have this effect even when leaf necrosis was severe. B injury was severe when the B concentration in old leaf tissue was 1,000 p.p.m. of dry weight.—Univ. Calif., Los Angeles.

1689. Staňková-Opočenská, E.
Fusariosa aster. I. část. Příspěvek k biologii parasita způsobujícího fusariosu aster. II. část. Průzkum nejvhodnějších způsobů boje proti fusariose aster. **(Aster wilt. I. A contribution to the biology of the causal organism of aster wilt *(Fusarium conglutinans* var. *callistephi)*. II. A survey of the most suitable methods of control.)** [Russian summaries $\frac{3}{4}$ and $\frac{1}{3}$ pp. respectively.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1957, **30**: 727-40, and 741-8, bibl. 48, illus.

When control methods recommended abroad were tested at Průhonice it was found that soaking aster seeds for 30 min. in a 0·1% solution of mercuric chloride gave good control of wilt but reduced germination. Steam sterilization of the soil prevented infection for 3–4 weeks and stimulated plant growth. In preliminary work on other methods of control, carnations appeared to be an unsuitable preceding crop, phytoncides from garlic and onion retarded mycelium growth, and soaking the seeds for 1 hr in a 500 p.p.m. solution of the antibiotic Acti-dione reduced infection and stimulated germination. The effect of the antibiotic applied as a spray to seedlings is being studied.

1690. Singh, T. C. N., and Ponniah, S.
Effect of musical sound of *Veena* on balsam plants.
Proc. Bihar Acad. agric. Sci., 1955, **4**: 122-5, from abstr. in *Biol. Abstr. Sect. D*, 1957, **31**, No. 35,998.

After daily excitation for a period of 25 minutes during 8 weeks, by playing the tune of *Kkaraharapriya raga* on a *Veena* [a string instrument] at a pitch of 4·5 in a closed room having normal light and ventilation, the growth in length of the shoot of *Impatiens balsamina* was 20% greater than the control, and production of leaves was 72% over the control. The first visible change in the experimental plants was soon after the 4th week. In general, the area of the leaves of the experimental plants was greater than that of the control. There was, however, no effect on the date of flowering.

1691. Tandon, S. L., and Bali, P. N.
Colchicine-induced tetraploidy in *Iberis amara* L.
Curr. Sci., 1957, **26**: 357-8, bibl. 2, illus.

Covering the apical growing points of candytuft seedlings of 6 to 8 leaves with cotton wads kept moist with aqueous colchicine solution (0·1 and 0·2%) for 6–12 hours induced tetraploidy. The tetraploid plants were larger in many respects than diploids and had larger flowers and fruits. The tetraploid flowers may be horticulturally valuable.

1692. (Mehlquist, G. A. L.)
Effects of atomic radiation on carnation plants explored.
Flor. Exch., 1957, **129**(15): 15, 50-1.

Plants of 4 Sim varieties (Red, Pink, White and Cardinal) were irradiated with dosages up to 40,000 rontgens. The number of reversions to ordinary Red Sim greatly exceeded the number of changes from red to white or pink. It is suggested that White and Pink Sim are periclinal chimaeras, and that when irradiation destroys the epidermal layer of the growing point, it is regenerated from underlying unmutated tissue. Other mutants obtained included pure white and pink strains of White and Pink Sim respectively. Possible ways in which irradiation might be of benefit to the carnation industry are discussed.—Univ. Conn.

1693. Butters, K. D.
The rooting of carnation cuttings.
Exp. Hort., 1957, No. 1, pp. 56-8, bibl. 2.

In experiments by the N.A.A.S. at Cheshunt and in 2 local nurseries, it was found that carnation cuttings broken off just above a node, so that the leaves were left behind on the stock plant, rooted as well as, or better than, cuttings prepared in the conventional way (i.e. cut with a knife below a node and the 2 lower leaves removed). The breaking method avoids the use of a knife during propagation, thus minimizing the spread of *Erwinia* slow wilt [see *H.A.*, 26: 1974]. It also saves time in preparing the cuttings.

1694. Ragetli, H. W. J.
Onderzoekingen over een virusremstof voorkomend in *Dianthus cariophyllus* L. Werkingsspectrum, remmingsmechanisme en aard. **(Studies on a virus inhibitor occurring in *Dianthus caryophyllus*—its range of action, mechanism of inhibition, and nature.)** [English summary 9 pp.]
Tijdschr. PlZiekt., 1957, **63**: 245-344, bibl. 42, illus.

A virus inhibitor isolated from carnation was shown to be active against all of the 14 viruses tested, but the inhibitory effect appeared to be related to the nature of the individual host plant species. The inhibitory effect was strongest in *Phaseolus vulgaris*, *Nicotiana* varieties, *Cucumis sativus*, and various Cruciferae, and was weakest in Centrospermae. Carnation was protected from virus infection to some extent by its own sap when this was concentrated.

1695. Friesdorf.
Chrysanthemen — Neuheitenprüfung 1956. **(Tests of new chrysanthemum varieties, 1956.)**
TätigkBer. gärtn. Versuchsanst. Friesdorf, 1956, **28**: 11-30.

Of 92 new chrysanthemum varieties tested at Friesdorf/Bad Godesberg the following are described as very promising: Westfield Bronze, Beauty Queen, Connie Mayhew, Imperator and Crimson Robe. Ten other varieties are recommended for trial by growers.

1696. Quarrell, C. P., and Cooke, D.
Effect of propagation treatments on cropping of chrysanthemums.
Exp. Hort., 1957, No. 1, pp. 5-7.

Experiments were conducted during 1953 and 1954 at Fairfield, Luddington and Stockbridge House on the treatment of chrysanthemum cuttings up to the time of planting out in the open ground. The variety Sweetheart or one of its sports was used. The performance of the plants was measured by the total number of blooms per plant, the size of the flowers and the length of the stems. Only small and inconsistent differences were obtained between the use of J.I.P.1 and J.I.P.2 composts for the rooting and potting media. All cuttings were rooted in seed trays. Bedding out the rooted cuttings into frames in a 2½-in. layer of compost at 4 in. apart gave consistently better results than potting in 3½-in. pots or soil blocks placed in frames pot-thick, or than leaving the rooted cuttings untransplanted in the seed trays. Potting up was slightly better than planting in soil blocks. Growing on the cuttings in the seed trays in which they were rooted, until planting in the open, gave the poorest results.

1697. Kristoffersen, T.
Krysantemum (*Chrysanthemum* × *hortorum* Bailey) som kortdagsplante. **(Chrysanthemum as a short-day plant.)**
Gartneryrket, 1957, **47**: 807-27, bibl. 28, illus.

Year-round production of chrysanthemums for cut flowers. Once a month cuttings were taken of the varieties New Crusader, Top Score and Arcadia. The mother plants were illuminated continually from August onwards and the cuttings from the time of insertion. Artificial lighting was discontinued in the middle of April. Illuminated plants were stopped before transplanting, others two weeks after transplanting. The plants received short-day treatment from the time the stems were 10 cm. long until the flower colour was visible. The experiments showed that flowers of good quality can be produced from April onwards. In the summer months it took the plants 4 months to flower from inserting the cuttings and 3 months from transplanting. When flowering in May–June the variety Arcadia had 8 blooms and buds per stem, in July–August 18, and in October 9. *Trials with varieties for cut flowers.* Some fifty, mostly American, varieties were included in these trials and the majority produced blooms of excellent quality. *Cultural methods of growing chrysanthemums for cut flowers compared.* For varieties that are intended to bloom before November planting in the glasshouse with subsequent short-day treatment proved superior to three other methods tested. *The production of short pot plants.* Plants grown under conditions of regulated day-length were much shorter and of better quality than were untreated controls. Although the American method of short-day treatment can be used in Norway to produce larger plants of the decorative type (3–4 months), varieties which are not disbudded did best when given short days from the insertion of cuttings onwards. This treatment reduced the growing season to 2–2½ months. It is not clear yet how late cuttings may be inserted, but it seems probable that this should be done before mid-July. If cuttings are inserted before June 1 the plants have to be stopped twice by the "soft pinch" method, the first time about 2 weeks after potting and the second time 10–14 days later.—Inst. Floricult. Glasshouse Crops, Coll. Agric., Norway.

1698. Volodarskij, N. I.
Flowering of chrysanthemums grown under continuous illumination. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1957, **117**: 504-6, illus.

Systematic removal of laterals from chrysanthemums advanced flowering in plants grown in short days and also enabled plants grown under uninterrupted illumination to flower. When the growing point of the main stem was removed early and only one lateral was allowed to develop no flowering occurred under uninterrupted illumination.—Kuban agric. Inst., Krasnodar.

1699. Tsukamoto, Y.
Studies on retarding chrysanthemum flowering by growth substance sprays. (III) Combinations of growth substances and electric lighting. [Japanese, with English summary 1 p.]
J. hort. Ass. Japan, 1957, **26**: 192-8, bibl. 9, illus.

Applications of NAA were given to December King as a partial substitute for light in retarding flowering. Plants were placed at varying distances from the light source and treated with 50 or 100 p.p.m. NAA. In control plants the effect of light in retarding flowering declined as light intensity decreased, but the reduction was much less in plants treated at both levels of NAA. Some growth inhibition was apparent at both levels of NAA. [For part II see *H.A.*, 28: 683.]

1700. Powell, E. N., and Andreasen, R. C.
Responses of bench-grown *Chrysanthemum morifolium* to maleic hydrazide.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 482-9, bibl. 7, illus.

Bench-grown chrysanthemum plants were treated with MH either by immersion of the tops before planting, or by spraying when the plants had become established, i.e., at the normal stage for pinching. At appropriate concentrations of MH, the chrysanthemums responded similarly to either treatment. The general responses to MH were as follows: (1) Cessation of terminal growth; the concentration necessary to ensure this response was about 1,200 p.p.m. for the spray treatment and 900 p.p.m. for the cutting dip. (2) Stimulation of laterals, more being present on MH-treated than on pinched plants. (3) Retarded growth of laterals. (4) Delayed date of flowering. (5) Production of malformed leaves. (6) Production of a percentage of abnormal flowers. In view of (3), (4) and (6) above it is not considered that the use of MH would be successful in the commercial production of *Chrysanthemum morifolium*. [From authors' summary.]—Cornell Univ., Ithaca, N.Y.

1701. Hollings, M.
Investigation of chrysanthemum viruses. II. Virus *B* (mild mosaic) and chrysanthemum latent virus.
Ann. appl. Biol., 1957, **45**: 589-602, bibl. 11, illus.

Studies are reported on symptoms, host range and transmission. Virus *B* had a dilution end-point of 1/10 to 1/1,000, depending on the host plant tissue from which sap was obtained, and was inactivated within 24 hr. at 18° C. or within 10 min. at 70–75° C. Latent virus had a dilution end-point of 1/200 to 1/500, and was inactivated after 10 min. at 70° C. or within 48 hr. at room temperature. [For part I see *H.A.*, 25: 3093.]—Plant Path. Lab., Harpenden, Herts.

1702. (Shanks, J. B., and Rerko, L.)
Ohio State conducts geranium research.
Flor. Exch., 1957, **129**(16): 17.

Some recommendations for growing geraniums are given from the University of Maryland. At Ohio State University several cultural experiments have been carried out. By applying high N levels to stock plants more rooted cuttings per plant were obtained. The production of plants for spring sales has been studied under different environmental conditions. Temperature had no effect on the number of shoots per plant, but shoot growth was greatest at 50° F. Shoot number, shoot length and the number of flowering plants were increased by keeping the plants wet. There was an increase in stem length when peat or manure was added to the soil; the addition of peat increased flowering, but additions of manure decreased the percentage of flowering plants. Fertilization had no effect on the number of plants which flowered in clay or in clay and peat soils. Regular fertilization increased both the number and length of shoots and did not reduce flowering, except with plants grown in clay soil at 50° F.

1703. Davis, D., Deak, J., and Rothrock, J. W.
The effect of gibberellins on vegetative growth and flowering habit of geranium.
Bull. N.Y. St. Flower Grs, 1957, No. 142, pp. 3, 5, bibl. 4, illus.

A single foliage application of gibberellic acid at 1, 10, or 100 p.p.m. increased stem height but did not reduce the root weight : shoot weight ratio of *Pelargonium hortorum* var. Olympic Red. When the potassium salt of GB was applied at 10 p.p.m. to either foliage or flower buds, just before the latter started to show colour, the inflorescences of both Olympic Red and White Wonder were increased in size, and persisted longer than those of untreated plants. This is the first report of GB increasing flower size [but see also *H.A.*, 28: 690], an effect which was due to increases in both pedicel length and petal width.—Merck, Sharp and Dohme Res. Labs, Rahway, N.J.

1704. Liebi, W.
Belichtungsversuche mit Gloxinien. (**Illumination trials with gloxinias.**)
Schweiz. Gärtnerztg, 1957, **60**(44): 4.

Illumination of gloxinias at night for specified periods between 1st December and 15th March shortened the growing period by 8 weeks and reduced production costs.—Gartenbauschule Oeschberg.

1705. Njoku, E.
The effect of mineral nutrition and temperature on leaf shape in *Ipomoea caerulea*.
New Phytol., 1957, **56**: 154-71, bibl. 22.

Lobing of new leaves was reduced and their production increased in basket-grown plants of *Ipomoea caerulea* by raising the night temperature from 22 to 30° C., or by adding any one of the 3 major nutrients to the soil, by far the greatest of these nutritional effects being that of N. All interactions of these nutrients were positive except for P+K, which slightly increased lobing and reduced the rate of production of leaves. The inverse relationship between rate of production and depth of lobing was very marked.—Univ. Coll., Ibadan, Nigeria.

1706. Van Steveninck, R. F. M.
The effect of growth substances on pod-setting in lupins.
N.Z. J. Sci. Tech., Sect. A, 1957, **38**: 1011-14, bibl. 12.

An attempt was made to prevent shedding of flowers and pods by using growth-substance sprays in order to increase the seed yield in yellow lupins (*Lupinus luteus* L.). None of the six growth substances, which were applied at three different concentrations, caused a significant change in seed yield. *p*-Chlorophenoxyacetic acid and γ-phenylbutyric acid had a slightly depressing effect on yield; 2,3,5-tri-iodobenzoic acid at 1,000 p.p.m. caused a significant increase in seed size. [Author's summary.]—D.S.I.R., Christchurch.

1707. Barton, L. V., and Chandler, C.
Physiological and morphological effects of gibberellic acid on epicotyl dormancy of tree peony.
Contr. Boyce Thompson Inst., 1957, **19**: 201-14, bibl. 5, illus.

Gibberellic acid has been found to promote the growth of dormant epicotyls of tree peony (*Paeonia suffruticosa*) replacing the need for low temperature pretreatment for the production of green shoots in the greenhouse. Application of 1, 10 or 100 µg. to the hypocotyl of the germinated seed before planting in soil caused the emergence of green shoots above ground in three weeks or less. Most rapid development of the epicotyl followed treatment with 100 µg. gibberellic acid, but more normal growth resulted from the lower dosages. This is the only chemical which has been found to break epicotyl dormancy of tree peony. [From authors' summary.] Morphological and anatomical effects are described in detail.

1708. Kosugi, K., and Mino, S.
Studies on flower bud formation in *Platycodon grandiflorum*. (I) On the time of flower bud initiation and development.
Kosugi, K., and Marui, T.
Idem. (II) Effects of temperature and day-length on flower bud initiation and flowering.
[Japanese, with English summaries ¼ and ½ p.]
J. hort. Ass. Japan, 1957, **26**: 199-200, bibl. 6, illus., and 201-4, bibl. 4.

Under natural conditions at Kanagawa in 1955 initiation in *Platycodon grandiflorum* started on May 12 and flowering on June 2. Initiation and flowering occurred soonest after planting when plants were grown at 20° C. At lower temperatures development was less rapid. Flowering was not affected by day-length.

1709. Plummer, T. H., and Leopold, A. C.
Chemical treatment for bud formation in *Saintpaulia*.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 442-4, bibl. 9.

Bud initiation in the basal callus of leaf cuttings of *Saintpaulia ionantha* was promoted by the application of either adenine sulphate or of kinetin. Under the conditions tested, optimal bud formation was obtained with 25 p.p.m. of kinetin. [From authors' summary.]—Purdue Univ., Lafayette, Ind.

1710. Meijer, G.
The influence of light quality on the flowering response of *Salvia occidentalis*.
Acta bot. neerl., 1957, **6**: 395-406, bibl. 21, illus.

Plants of *Salvia occidentalis* were shown to have 2 photoreactions, possessing different spectral sensitivity. The reaction which occurs during the main light period was strongest in blue and infra-red light, while the night break reaction was stimulated more by the red part of the spectrum than by blue light.—N. V. Philips' Gloeilampenfabrieken, Eindhoven.

1711. Tepe, W.
Probleme des Anbaues von *Limonium tataricum*. **(Cultural problems with *Limonium tataricum*.)**
Gartenbauwiss., 1957, **22**: 272-7, bibl. 2.

Plant losses of statice were high under conditions of excess soil moisture, white grub attack, nitrochalk manuring, and a deficiency of soil K. Accumulation of nutrients and organic substances occurred to a much greater extent in the inflorescence than in the leaves and roots; thus fertilizer applications after harvest are important. A medium heavy soil, rich in humus and nutrients, is most desirable for successful growth.—Inst. Bodenk. PflErnähr., Geisenheim.

1712. Heimann, M.
Die Welkekrankeit von *Limonium tataricum* (Staticesterben). **(Wilt disease of statice.)**
Gartenbauwiss., 1957, **22**: 278-87, bibl. 8, illus.
Krankheiten der Statice und ihre Bekämpfung. **(Statice diseases and their control.)**
Gartenwelt, 1957, **57**: 376-8, bibl. 6, illus.

The first article is summarized in the first part of the second, and describes the symptoms caused by *Fusarium oxysporum* on statice plants. Control measures include adequate manuring, white grub control, and removal of premature flowers. The second article also describes rust symptoms, induced by *Uromyces limonium*, which chiefly attacks young plants. Recommended control measures are the removal of diseased leaves and spraying with zineb. Inflorescences may be protected from rot attack (*Botrytis cinerea*) by covering the flowering plants with frames or polythene sheets, or by sprays of barium polysulphide or zineb.—Inst. PflKrankh., Geisenheim.

1713. Ono, H., and Takanashi, S.
Studies on the cultivation of stocks in a vinyl house. Effect of time of covering.
[Japanese, with English summary ¼ p.]
Bull. Kanagawa agric. Exp. Stat. hort. Branch, 1957, No. 5, pp. 73-9, bibl. 11.

On the relatively warm Miura peninsula stock plants covered early (end of October) by a vinyl house made better growth and had longer stems and more flowers and petals than those covered later.

Bulbs, tubers, etc.

(*See also* 1049, 1785b, e, l, v, 1786g-i, n, q, r, 2016, 2034.)

1714. Horton, D. E.
Bulbs.
A.R. Rosewarne exp. Hort. Stat. 1956, 1957, pp. 18-36, bibl. 2.

The highest number and quality of King Alfred daffodil flowers was obtained from the earliest (August) planting. The optimum planting depth was 5 in. to the base of the bulb. Shallow planting also gave best results with Rose Copeland tulips. With both narcissi and tulips planting 5 rows per bed at 9 in. and ploughing in with a tractor resulted in a heavier bulb crop than various ridge methods of planting. Preliminary results are reported of an experiment on the effect on the bulb crop of head removal and cropping. Of various methods tested for weed control and destruction of dead foliage in narcissus, straw burning was the most effective and advanced subsequent growth and flowering. Top dressing with 2 cwt. sulphate of ammonia per acre, up to 3 times during the season, had no effect on flower or bulb yields of narcissus. In an NPK experiment with tulips and narcissus, high levels of K resulted in the best growth and bulb yield. No differences in flower count, plant growth or bulb yield resulted from applications of various forms of organic or inorganic N to narcissus. Observations are reported on varietal resistance of tulips and narcissus to hot water treatment and on optimum date of treatment. Freesias grown from seed in a mobile glasshouse produced more flowers when sown under a sand, sawdust or peat mulch than under a soil mulch or no mulch. Different methods of growing tulips and narcissi under mobile glasshouses were also compared.

1715. (Stuart, N. W., Gill, D. L., and Gould, C. J.)
How to store bulbs for good blooms.
Agric. Res., Wash., 1957, 6(5): 14, illus.

Tulip bulbs should be kept at room temperature for several weeks after digging to develop flowers, then for 6 weeks at 40°–45° F. and thereafter for 4 to 6 weeks at 48°–50° F. in a cool store or in the ground; the resultant plants should produce long-stemmed flowers 1 to 2 months later. Easter lilies need 6 weeks at 45°–50° F. just before planting if they are to bloom early; storage at 31°–33° F. for the same period will cause later blooming. To force Dutch iris bulbs humid heat-curing at about 90° F. for 10 days is necessary, followed by storage at 50° F. for 6 weeks; bulbs so treated and planted in mid-Oct. will flower in Dec.–Jan.

1716. Langhans, R. W.
Forcing bulbs and azaleas.
Bull. N.Y. St. Flower Grs, 1957, No. 143, pp. 1, 6-8, illus.

Daffodils, tulips, hyacinths and azaleas were forced in artificial light, using 3 types of lamp. In size and quality the plants produced were equal to, or better than, plants produced in natural light. In general, the forcing period was reduced under artificial light conditions. Growth under fluorescent lighting was better than under incandescent or mercury-vapour lamps. Azalea flower colour was paler under artificial light than in natural light. Brief recommendations are made for installing an artificial lighting system.

1717. Jeff, A. E.
Anemones.
A.R. Rosewarne exp. Hort. Stat. 1956, 1957, pp. 6-13.

Nutrition: The earliest planting (20 May) gave the highest yields. Plots receiving P+K or K alone generally gave the best results. N had a depressing effect on yield except when given in a complete fertilizer. *Cultural operations:* In well-drained soil growth on raised beds was inferior to that on level beds. Corms planted 2 or 3 in. deep cropped more heavily than those planted 1, 4 or 5 in. deep. *Diseases:* Results of spraying trials for control of downy mildew, *Peronospora ficariae*, were inconclusive, but the general health of the plants was best following treatment with Dithane Z.78. Soil treatment with 2% formalin solution at 5 gal./sq. yd. reduced primary infection considerably. Calomel dust was ineffective. *Weed control:* A good kill of weeds was obtained by spraying with sulphuric acid or PCP or by flame gunning 12 days after planting. *Protection from weather:* Flat-topped cloches gave better results than Dutch lights or bamboo screening.

1718. Petiet, J.
Zelfbestuiving bij anemonen. **(Self-pollination of anemones.)** [English summary 10 lines.]
Meded. Dir. Tuinb., 1958, **21**: 31-4, illus.

Self-pollination of *Anemone coronaria*, varieties Hollandia and Sylphide, was successful in the open under isolating covers designed by the Instituut voor Veredeling van Tuinbouwgewassen. The covers were cylindrical, of cheese cloth supported on an iron framework, with a top of brass gauze. Glass, plastic and paper covers were unsatisfactory. Fly pollination was more successful than bee pollination and resulted in 86% seed set in one year.

1719. Rünger, W.
Untersuchung über den Einfluss verschieden langer Kurztagsperioden nach dem Schnitt der Blattstecklinge auf die Entwicklung der adventiven Triebe von Begonia 'Konkurrent' und 'Marina'. **(A study on the effect of different durations of short-day treatment after taking leaf cuttings on the development of adventitious shoots by the begonia varieties Konkurrent and Marina.)**
Gartenbauwiss., 1957, **22**: 352-7, bibl. 2.

Leaf cuttings of 2 begonia varieties were kept in short-day conditions for varying periods before being transferred to long-day conditions. After 60 short days flowers were produced by some adventitious shoots, and the number of flowering shoots increased with increasing periods of short-day treatment. Adventitious shoot formation was less in plants kept in short days than in those transferred to long days. Growth of adventitious shoots was promoted by long-day conditions, but not until about 40 days had elapsed after taking the cuttings.—Inst. Zierpflb., Tech. Hochsch., Hannover.

1720. Rünger, W.
Über die Triebentwicklung der Blattstecklinge von Begonia 'Konkurrent' und 'Marina' in verschiedenen Tageslängen. **(Shoot development of leaf cuttings of the begonia varieties Koncurrent and Marina in different day lengths.)**
Gartenbauwiss., 1957, **22**: 358-9, bibl. 2, illus.

Young Lorraine begonia plants kept in various day-lengths, became generative in photoperiods of 12½ hours but remained vegetative with 13 hours of light. Leaf size increased with the approach of the critical day-length.—Inst. Zierpflb., Tech. Hochsch., Hannover.

1721. Ozolin, P. K.
Propagation of dahlia by seed. [Russian.]
Tr. Botan. Sada AN UzSSR, 1956, No. 5, pp. 61-70, from *Ref. Ž.* (*Biol.*), 1957, No. 14, Abstr. 60,921.

Dahlias introduced into Uzbekistan did not acclimatize well, became susceptible to pests and diseases, and degenerated with repeated vegetative propagation. Propagation by seed, obtained from open pollination, resulted in healthy plants adapted to local conditions.

1722. Dogonadze, D. S.
Propagation of dahlia by seed and the importance of this for landscape gardening. [Georgian, with Russian summary.]
Vestn. Tbiliss. Botan. Sada, 1956, No. 63, pp. 197-202, from *Ref. Ž.* (*Biol.*), 1957, No. 14, Abstr. 60,922.

Dahlias from seed withstand unfavourable conditions in Georgia better than those propagated vegetatively. The seedlings flower in their first year. Seed is sown under glass from March 10–15, and in the open between April 15 and May 15.

1723. Roistacher, C. N., Bald, J. G., and Baker, K. F.
2,3,5-Triphenyltetrazolium chloride as an indicator of germinability and dormancy of gladiolus cormels.
Hilgardia, 1957, **26**: 685-704, bibl. 60, illus.

A technique is described in which tetrazolium can be used as an indicator of the depth of dormancy in gladiolus cormels. A positive correlation was found between the degree of tetrazolium coloration and the germination potential of the cormels. Cormels stored at 40° F. showed an increase in tetrazolium reddening over a period of 5½ months, and this increase was positively correlated with increased germination of sister cormels planted at various intervals. Cormels with the outer husks cracked had a higher degree of tetrazolium reddening and a correspondingly higher germination than uncracked cormels. Freshly-harvested cormels showed a reddening reaction to the tetrazolium test which was different from that of mature cormels and which disappeared completely after a short time. There was an indication that large cormels were less dormant than smaller ones. Varietal differences in the rate of tetrazolium reddening were observed. The tetrazolium test may also assist in determining tolerance to heat treatment applied against pathogens.—Agric. Exp. Stat., Los Angeles.

1724. Roistacher, C. N., Baker, K. F., and Bald, J. G.
Hot-water treatment of gladiolus cormels for the eradication of *Fusarium oxysporum* f. *gladioli*.
Hilgardia, 1957, **26**: 659-84, bibl. 31, illus.

The thermal death point of dormant gladiolus cormels kept in hot water for 30 minutes lay between 135° and 140° F. The thermal inactivation temperature by hot water of *Fusarium oxysporum* f. *gladioli* in the cormel lay between 128° and 135° F. *Stromatinia gladioli* sclerotia in basal leaf tissue were killed by 125° F. for 30 minutes. For successful commercial disinfection the following points are of importance: cormels are more tolerant of heat treatment than are corms; cormel reaction to heat treatment was related to the depth of dormancy; the efficiency of hot-water treatment was increased by pre-soaking the cormels and by the addition of 5% ethyl alcohol to the hot water. Sprouting was markedly increased by removal of the outer husks from the cormels 73 days after hot-water treatment; cracking the cormels before or immediately after hot water treatment sharply reduced the survival percentages.—Agric. exp. Stat., Los Angeles.

1725. Monselise, S. P.
Growth and photosynthesis of gladiolus plants grown under various light conditions.
Bull. Res. Coun. Israel, Sect. D, 1957, **5**: 239-44, bibl. 4.

Growth and assimilation rates of plants originating from cormels and grown at various light intensities have been studied. Total and leaf dry weight, plant height and the ratio of leaf to root dry weight increased constantly with age. Root dry weight increased only slightly with age. Moisture percentage, leaf N content, relative growth rate, and net assimilation rates in relation to leaf weight and leaf total N decreased with age. When compared with plants grown at low light intensities, plants grown in full light developed larger total and partial dry weights and higher leaf N contents. Size of new corms, weight of cormels and the percentage of flowering plants were larger, but plant height and the leaf : root weight ratio were lower. Derived data did not show the influence of different light intensities, apart from a peak at the time of spike stalk elongation in plots with a higher percentage of flowering plants, which happened to be high light intensity plots. [From author's summary.]—Hebrew Univ., Rehovot.

1726. Yasuda, I., and Yokoyama, J.
Effect of day length on growth and flowering of gladiolus. 2. Effect of day lengths of 10 and 11 hours in summer. [Japanese, with English summary 19 lines.]
Sci. Reps Fac. Agric. Okayama, 1954, No. 4, pp. 12-22, bibl. 18.

Limiting daylight to 10 to 11 hours in summer resulted in somewhat earlier flowering but raised the ratio of blind individuals. It only slightly diminished plant height and the number of leaves and flowers. Previous experiments had shown that 9 hours light is insufficient to induce flowering. The present trials indicate the existence of some factor other than day length, which also affects flowering, since a high blind ratio occurs in winter, even though the temperature is kept at the optimum. [See also *H.A.*, 26: 2996.]

1727. Royal Horticultural Society.
The lily year book, 1958, No. 21.
R.H.S., London, 1957, 9×5½ in., pp. 157, illus., 10s. + 1s. 3d. postage or U.S. $1.65 post free.

This issue is mainly devoted to articles on lilies, particularly hybrids, grown in famous gardens in various parts of the country, and in Eastern Canada, California, New Zealand and Iran. There is also an interesting account by J. de Graaff of the commercial production of hybrid lilies in America. C. Bullock writes on selected American hybrid lilies and hybridizers. The scent of lilies is discussed by S. Clay. Two of the Lily Group discussions reported deal with the genus *Erythronium* and lilies for a small garden.

1728. Jackson, A. A.
The Formosa lily as a commercial crop.
Agriculture, Lond., 1958, **64**: 554-5, illus.

Seed of *Lilium formosanum* var. Pricei, was sown in heat under glass in January, the seedlings were moved to the flowering house in March and flowered in August and September. The capsules ripened in October.

The large, single blooms made an average price of 8d. each over the 3 years 1954–57 and the average yield of a 100×30 ft. house was 10,500 blooms.—Wye Coll., Kent.

1729. PRICE, P. B.
Reproduction and growth in various lily species following X- and gamma-irradiation of pollen and X-irradiation of seeds.
Diss. Abstr., 1957, **17**: 1650-1, being *Publ.* 21,534 of 124 pp.

The effects of irradiation on 12 species, varieties and hybrids of *Lilium* are reported. *Lilium davidi* seeds given 5,000–15,000r developed their first true leaves faster than non-irradiated seeds. There were variations in the sensitivity of different species to irradiation.—Univ. Md.

1730. ROYAL HORTICULTURAL SOCIETY.
The daffodil and tulip year book, 1958, No. 23.
R.H.S., London, 1957, 9×5½ in., pp. 164, illus., 10s.+1s. postage or U.S. $1.65 post free.

This issue contains 2 very helpful articles on hot water treatment of bulbs, one by E. van Slogteren discussing the various causes of success and failure, and one by D. E. Horton on the internal stages of bulb development in relation to date of hot water treatment. There is also a brief discussion by H. W. Abbiss on the effects of various temperatures, natural and applied, on bulb flower quality. J. Lea contributes notes on his early experiences in breeding daffodils, which should be of considerable value to other beginners. There are 2 useful notes by F. A. Secrett, one on the use of mobile houses for bulb forcing and the other on the control of tulip fire. J. L. Richardson reports on his successful control of daffodil flies with a combination of Aldrex soil dusting, Aldrex 30 dipping and Dieldrex 15 spraying. Other articles of interest include a description of the small jonquils and accounts of daffodils in Australia and America. Various shows and competitions are reported.

1731. WOODVILLE, H. C.
Experiments on the control of bulb fly damage.
A.R. Rosewarne exp. Hort. Stat. 1956, 1957, pp. 74-6.

Narcissus were given good protection against bulb fly for 2 years by a pre-planting cold dip of 0·2% aldrin, 0·2% dieldrin, 0·5% chlordane or 0·12% heptachlor. Aldrin was the cheapest material. The addition of very dilute chlordane or heptachlor to the standard hot water bath also gave good protection, but bulbs not fully dormant were apt to suffer root scorch. [See also *H.A.*, 27: 708, 2726 and 3762.]

1732. HAGIYA, K., AND AMAKI, W.
Studies on offsets of tulip bulbs. (I) Classification of tulip offsets and varietal differences in their formation. [Japanese, with English summary ¼ p.]
J. hort. Ass. Japan, 1957, **26**: 205-8, bibl. 6, illus.

Different types of offset produced by tulip varieties are classified according to the numbers produced and whether or not they branch. No relationships have been observed between offset formation and horticultural families, earliness of flowering, the content of soluble matter in the bulb, or root number.

1733. GILL, D. L., AND OTHERS.
Some effects of bulb storage temperatures and planting conditions on production of tulip flowers in the greenhouse and outside in southern Georgia.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 451-60, bibl. 6.
GILL, D. L., AND STUART, N. W.
Cooling of bulbs seen as aid in southern tulip production.
Flor. Exch., 1957, **129**(12): 15-17, bibl. 4.

Tulips from the Netherlands and from Washington were grown outside at Tifton, Georgia, and in the greenhouse at Beltsville, Maryland, following various precooling temperatures and periods. Satisfactory tulips were obtained when the bulbs were precooled for at least six weeks at 40° F. and planted in December and January. Less satisfactory results were obtained following precooling at 50°. In 1956 comparable stem lengths were produced by bulbs precooled 47 days at 40° and kept out of storage 31 days before planting, and by bulbs stored 54 days at 40° and held out of storage three days before planting. The effect of 40° or coldframe storage after flatting of precooled bulbs varied with the variety. Delayed planting after precooling reduced flower production in some varieties and under some planting conditions. Better stem length and more flowers were produced by bulbs planted 4 in. deep than by bulbs planted 8 in. deep. Shading made stems longer. [Authors' summary to first paper.]—U.S. Dep. Agric., and Ga Coastal Plain Exp. Stat., Tifton.

1734. DICKEY, R. D.
Effect of storage treatment on growth and flowering of tulips in Florida.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 461-77, bibl. 8.

In Florida the cold period required for bud growth in tulip bulbs has to be supplied by refrigeration of the dormant bulbs before planting. Flowering of 6 varieties was adequate when the storage temperature was 40–50° F. for 50 to 120 days. Bulbs stored a 36° F. for 50, 60 or 75 days flowered well, but storage at 36° F. for 90 days reduced flowering. Bulbs stored at room temperature did not flower, and flowering was unsatisfactory with storage at 40, 50 or 60° F. for 30 days or at 60° F. for 60, 90 or 120 days. There were also varietal differences in the response to certain storage temperatures. Delaying planting after cold storage seriously reduced flowering.—Fla agric. Exp. Stat., Gainesville.

1735. PILTZ, H.
Verträglichkeitsversuch zur Begasung von Tulpenzwiebeln mit Methylbromid. **(Tolerance studies on fumigation of tulip bulbs with methyl bromide.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1958, **10**: 6-7, bibl. 1, illus.

Fumigation of Rose Copeland tulip bulbs with methyl bromide at 20 g./cu. m. for 5 hours reduced flowering.

Following treatment with 30 g./cu.m. for 10 hours flowering was almost totally inhibited.—Staatsinst. angew. Bot., Hamburg.

Lawns and sports turf.

(*See also* 1355, 1356.)

1736. Walker, C.
Lighter rates of seeding for playing areas and lawns likely to be satisfactory.
N.Z. J. Agric., 1957, **95**: 185, illus.

In spring and autumn seeding experiments, grass seed was sown at rates of $\frac{1}{5}$, $\frac{2}{5}$, $\frac{3}{5}$, $\frac{4}{5}$ and 1 oz. per square yard, selective weed killers were used and a standard fertilizer dressing was applied quarterly. Under these conditions $\frac{1}{2}$ oz./sq. yd. proved sufficient seed for lawns and $\frac{3}{4}$ oz./sq. yd. for sports fields. Invasion by *Poa annua* was greater in the autumn-sown than in the spring-sown plots.—Dep. Agric., Palmerston North.
J.R.L.

1737. Daniel, W. H.
Soil tests spotlight turf needs.
Bett. Crops, 1957, **41**(7): 8-15, bibl. 3.

Turf studies showed that the validity of soil tests for P and K was not affected by normal applications of fungicides. Of the 812 samples tested 15% of the established, and 40% of the new, lawns needed lime, most had adequate P, but many were low in K. Soil samples from fairways which had been irrigated were low in N and K.—Purdue Univ. J.R.L.

1738. (Lantz, H. L.)
Control grass disease with fungicide sprays.
Ia Fm Sci., 1957, **12**(3): 5.

Dollar spot and brown patch on bentgrasses were controlled by Kromad, Calocure, Upjohn RZ and a Tersan/Calocure mixture. The grass recovered best after treatment with Kromad.

1739. Carne, P. B., and Chinnick, L. J.
The pruinose scarab *(Sericesthis pruinosa* Dalman) and its control in turf.
Aust. J. agric. Res., 1957, **8**: 604-16, bibl. 13, illus.

This cockchafer is a serious pest of lawns, golf courses and pastures in coastal districts of eastern Australia. Effective control by insecticides can be achieved only in warm weather. Aldrin at 1–2 lb./acre quickly controls existing infestations but is volatile. Dieldrin and DDT are less effective but more persistent.

Orchids.

(*See also* 1785j, n.)

1740. Crovetto, A.
L'azione di particolari sostanze nutritive sulla germinazione dei semi di orchidea. **(The action of certain nutritive substances on the germination of orchid seeds.)**
Riv. Ortoflorofruttic. ital., 1957, **41**: 637-8, bibl. 7.

The time of germination of orchid seeds was reduced from 20 to 7 days when the normal culture medium (agar gel containing citric acid and inorganic salts) was modified by adding vitamins B_1 and PP, fresh coconut milk and indole-butyric acid [see also *H.A.*, 28: 716].

1741. Lange, A. H.
Aerial roots of *Vanda.*
Hawaii Fm Sci., 1957, **6**(2): 12, illus.

Aerial roots of *Vanda* Miss Joaquim orchids showed no geotropic response, but were negatively phototropic. These roots responded to external applications of growth substances by growing toward the side on which the stimulant was placed.

1742. Kodama, C. R., and Shoji, K.
Sepal wilt and bud drop of orchids.
Hawaii Fm Sci., 1957, **6**(2): 9-10, illus.

The effects of weather conditions and ethylene on *Dendrobium* bud drop and *Cattleya* sepal wilt were studied. Ethylene was not injurious to the *Dendrobium* species tested, but bud drop occurred during prolonged calm, humid, and cloudy weather conditions. There were indications that *Dendrobium* varieties differed widely in their susceptibility to bud drop. *Cattleya* plants were very sensitive to ethylene, but sepal wilt was prevented by the use of a brominated charcoal filter system.

1743. Nishida, T., and Boyle, W. W.
Insect and mite pests of orchids.
Hawaii Fm Sci., 1957, **6**(2): 7-8, illus.

Control of orchid pests in Hawaii may be obtained by legislative and cultural measures, but chemical control is the most effective. DDT controls orchid fly (*Eurytoma orchidearum*), orchid weevils (*Orchidophilus* spp.) and thrips, and many of the sucking insects are controlled by malathion. Chlorobenzilate is recommended against false spider mites and 2-spotted spider mites (*Tetranychus telarius*). Ants may be controlled by chlordane sprays, but these should not be sprayed on the plants.

1744. Alicata, J. E.
Metaldehyde spray in the control of slugs injurious to orchids.
Hawaii Fm Sci., 1957, **6**(2): 11, illus.

Two ground sprays of 1% metaldehyde, at an interval of 3 weeks, have given effective control of slugs (probably *Deroceras laeve*). This spray, plus the application of pinches of 3% metaldehyde powder, has been effective in killing slugs in pots. No phytotoxic effect of the spray has been observed on several orchid species. The giant African snail (*Achatina fulica*) may also be controlled by metaldehyde sprays.

Succulents.

(*See also* 1044, 1045, 1785q, 1786j, p.)

1745. Sieber, J.
Zur Aussaat und Jungpflanzen-Anzucht von Bromeliaceen. **(Seed germination and seedling growth of bromeliads.)**
Gartenwelt, 1957, **57**: 337-8, illus.

Germination and early growth of *Guzmania tricolor*, *Vriesia splendens* and *Nidularium innocentii* were studied in 8 types of substrate. The highest germination (86%) of *Guzmania* occurred in pure peat, but the highest average plant weight at 3 months was obtained in sand. *Vriesia* seed germinated best in sand (97%), but the highest average plant weight was produced in fine brick chips. No germination differences were observed with *Nidularium* in peat or fine brick chips, but plant growth was better in peat and was further improved by nutrient application to the roots. After pricking out *Guzmania* and *Vriesia* showed the best growth in brick chips plus peat with root nutrition; additional foliar nutrition depressed growth. [See also *H.A.*, 26: 2022.]

Roses.

(*See also* 1676.)

1746. Lundstad, A.
Moschatahybridene. Prøvedyrking av 15 sorter. **(*Rosa moschata* hybrids. Trials with 15 varieties.)**
Gartneryrket, 1958, **48**: 55-9, bibl. 7, illus.

Descriptions are given of 15 *Rosa moschata* hybrids under trial at the Institute of Dendrology and Nursery Management, Agricultural College of Norway. Elmshorn, Sangerhausen and Wilhelm are considered outstanding, and Bonn, Hamburg and Märchenland may also be worth planting. The other varieties were definitely inferior. High Noon was of interest as a cluster rose and Morning Star as a bush rose.

1747. Dalziel, H. C.
Rosa moyesii.
J. roy. hort. Soc., 1957, **82**: 439.

A method of propagating *Rosa moyesii* from cuttings is described. Vegetative shoots are taken from the main stem with a heel when 4 in. long, and after dusting with hormone powder inserted in pots containing fine sand. The pots are plunged in a frame, and shaded and watered. In July the cuttings are potted up.

1748. Kuppuswamy, K. P.
A note on the studies on budding of roses on wild briar rootstocks.
South Indian Hort., 1957, **5**: 77-8, bibl. 1.

In trials during 1954–56 in which President Mercia scions, with or without wood, were T-budded on rooted or unrooted *Rosa indica* stocks, a higher percentage of the buds took when the rooted briars were used. There was no difference in the take of scion buds with and without wood, but the latter were easier to handle and produced firm strong unions.—Sim's Park, Coonoor. J.R.L.

1749. Dernovič, V. V., and Zatučnyj, V. L.
A study on the spacing of essential oil-bearing roses in the Moldavian S.S.R. [Russian.]
Krat. Otčet. o naučn.-issled. Rabote Vses. n.-i. In-ta masllič. i efirnomasl. Kul'tur VASHNIL za 1955, Krasnodar, 1956, pp. 232-4, from *Ref. Ž.* (*Biol.*), 1957, No. 13, Abstr. 55,880.

In experiments from 1953 to 1955 the highest yield of petals, 6,977 kg./ha., was obtained from roses planted as espaliers at 2·5×0·5 m. Espalier culture on slopes also checked soil erosion.

1750. Zabala, S.
Una probable afección virosa del rosal. **(A probable virus infection of roses.)**
Idia, 1957, No. 111, p. 33.

The light red flowered rose María Enriqueta produced only red/pale pink variegated flowers when grafted with buds from a plant of an almost identical variety bearing variegated flowers.

1751. Miller, R. O.
Will black-spot infect misted roses?
Bull. N.Y. St. Flower Grs, 1957, No. 142, pp. 1-2, 4, bibl. 2.

Young rose plants were inoculated with *Diplocarpon rosae* and were then subjected to various treatments involving culture under mist, on dry benches and in a moist chamber providing conditions known to favour infection. Under mist the number of lesions produced per plant was low in winter, but rather high in summer, a difference which is attributed to the effects of misting in reducing temperatures to below levels favouring spore germination during the winter but not during the summer. Investigation of an accidental outbreak of black-spot confirmed that syringing is still the cultural practice most likely to favour black-spot development. —Dep. Floric., Cornell Univ.

1752. Weinstein, L. H.
Preservation of cut roses, new mildicide evaluated.
Flor. Exch., 1957, **129**(16): 13.

Three lines of work are described. (1) Freshly-cut Better Times roses were treated as follows: Stems and leaves were dipped in a 5,000–15,000 p.p.m. solution of the diethanolamine salt of maleic hydrazide plus Triton X-114, the stem bases were then dipped in the same solution for 30 minutes, and the flowers then transferred to a solution of 100 p.p.m. of aluminium sulphate plus 800 p.p.m. citric acid, and kept at 40° F. for 24–40 hours. Treated roses were superior in colour, form and lasting quality to untreated roses. An iron chelate (ferric disodium EDTA) alone or in combination with the aluminium-citric acid solution, inhibited opening of the flowers. (2) In studies on the control of powdery mildew an antibiotic P-189 has shown excellent eradicant properties. Further studies on its application are in progress. (3) Both petal and ovary tissues are able to incorporate $C^{14}O_2$ by the dark fixation mechanism; this ability decreases in ageing petals, but increases in ageing ovaries [see also *H.A.*, 27: 3785].—Boyce Thompson Inst., N.Y.

Other trees and shrubs.

(*See also* 1036, 1037, 1082g, 1322, 1333, 1334 1669, 1716, 1785c, d, f, g, i, r, 1786a-c, f, l.)

1753. Nelson, P. K. (Editor).
The hundred finest trees and shrubs for temperate climates.
Plants and Gdns, 1957, **13**: 161-240, illus., available as a separate from Brooklyn Botanic Garden, N.Y., price $1.00.

This number of the journal forms a handsomely illustrated handbook in which 100 ornamental tree species are described briefly with respect to their outstanding features, growth habit and uses, winter hardiness in different zones of the U.S.A. and Canada, soil needs, and varieties of special interest. Major pests and diseases and their control are also mentioned in some cases.

1754. (MAHLSTEDE, J. P.)
Test chemical sprays to defoliate trees.
Ia Fm Sci., 1957, **12**(3): 9, illus.

A 1% solution of maleic hydrazide with 1% Niagrathal (containing endothal) gave 45% defoliation of 3-year-old American elm trees 12 days after application, without affecting growth in the following spring. Maleic hydrazide used alone was phytotoxic. The MH-endothal mixture cannot be recommended until it has been tested on other nursery stock.

1755. NITSCH, J. P.
Growth responses of woody plants to photoperiodic stimuli.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 512-25, bibl. 8, illus.

Data are reported on the effects of photoperiod on the growth of seedlings and rooted cuttings of various ornamental trees and shrubs (stem elongation, increase in node number, behaviour of terminal growing point), on the modification of these responses by the application of gibberellic acid, and on changes in the balance of endogenous growth substances. Gibberellic acid caused or prolonged growth under short-day conditions, and with some plants (Japanese maple, oak, sumac and blue spruce) also stimulated growth under long-day conditions. A chromatographic study of endogenous growth substances in *Rhus typhina* showed that under short days there was a decrease in the level of growth-promoting substances and an increase in the concentration of inhibitors.—Cornell Univ., Ithaca, N.Y.

1756. TREECE, R. E.
The role of systemic insecticides in the control of insect pests of woody ornamental plants.
Diss. Abstr., 1957, **17**: 2100-1, being *Publ.* 22,216 of 170 pp.

Details are given of investigations involving more than 14 systemic insecticides applied to the soil and to foliage and stems. With soil applications higher dosages were required to destroy mites on broad-leaved evergreens than have been reported effective on more succulent plants. With applications to leaves and stems upward translocation was more extensive than downward translocation. The plant species studied included *Ilex crenata*, birch, *Malus*, *Prunus*, black walnut, spirea, and *Tilia cordata*. The pests included aphids, caterpillars, mites and scales.—Cornell Univ.

1757. SCHUDER, D. L.
Bionomics and controls for certain scale insects (Coccoidea, Homoptera).
Diss. Abstr., 1957, **17**: 2099-100, being *Publ.* 22,296 of 179 pp.

The investigation reported included spraying trials in which lilac and red twig dogwood (*Cornus stolonifera*) served as host plants. Control of *Lepidosaphes ulmi* was obtained by applying parathion, demeton, Thimet or malathion to newly-hatched crawlers. Dormant sprays and summer dusts were less effective than crawler sprays. *Lepidosaphes yanagicola* was controlled by parathion, malathion or DDT applied to the newly-hatched crawlers in the summer. During the winter lime sulphur or DN-289 may be used. Parathion and malathion sprays may also be used for controlling *Aonidomytilis solidaginis*, against which dormant sprays were not effective. *Trachycoccus hyperici* may be controlled by applying Phosdrin, Compound 12008, parathion or malathion when crawlers are being produced; dormant sprays were not effective.—Purdue Univ.

1758. ROBINSON, R. A.
***Abeliophyllum distichum* from stem cuttings.**
Gdnrs' Chron., 1957, **142**: 422.

Cuttings 3 in. long, taken on June 18 with a heel and with the growing tip and lower leaves removed and inserted immediately in an unheated propagating frame on the bench of a warm greenhouse, had rooted by July 31, whereas all cuttings taken on other dates failed. J.R.L.

1759. RICHARDSON, S. D.
Studies of root growth in *Acer saccharinum*. V. The effect of a long-term limitation of photosynthesis on root growth rate in first-year seedlings.
Reprinted from *Proc. kon. ned. Akad. Wetensch., Ser. C*, 1956, **59**: 694-701, bibl. 3.

When seedlings were transferred from a light intensity of 5,000 lux to one of 200 lux, the rate of root elongation immediately fell, then rose after some days, but finally declined and stopped altogether. A highly significant inverse relationship was found between the time required for the observed rise in growth rate and plant dry weight. Both rate and duration of growth were linearly related to dry weight, but there was no direct correlation between these variables and leaf area. [For parts III and IV see *H.A.*, 27: 3042.]—Lab. Plant physiol. Res., Wageningen.

1760. RICHARDSON, S. D.
Studies of root growth in *Acer saccharinum* L. VI. Further effects of the shoot system on root growth.
Reprinted from *Proc. kon. ned. Akad. Wetensch., Ser. C*, 1957, **60**: 624-9, bibl. 12, illus.

First-year seedlings of *Acer saccharinum* were grown in constant conditions of light (16-hours light at high and low intensity) and temperature (20° C.), and the response of roots to defoliation and disbudding was studied. Root growth stopped in seedlings in low light intensity after defoliation; under high light intensity root elongation also stopped after defoliation, but new lateral roots continued to form. Removal of the terminal meristem did not suppress root elongation but entirely suppressed lateral root formation. These results suggest that during the growing season root formation is determined by the presence of an active terminal meristem, whereas root elongation is controlled by a stimulus supplied by the leaves.—Lab. Plant physiol. Res., Wageningen.

1761. Teuscher, H.
Propagation of the flowering almond.
Amer. Nurserym., 1957, **106**(12): 13.

The common practice of budding *Prunus triloba multiplex* on plum stock is unsatisfactory as the plum is too vigorous, suckers profusely and is not fully compatible. *P. tomentosa* stock, however, appears to be long-lived and compatible; one-year-old stocks should be budded in July. Experiments were conducted at the Montreal Botanical Garden on raising *P. triloba* from cuttings. Cuttings taken from field-grown plants were unsatisfactory as they rooted slowly and were too immature in the autumn to overwinter well. Much better results were obtained by taking cuttings from 3- or 4-year-old plants potted up in autumn and gently forced in the greenhouse from January. Flowers were removed and cuttings taken with a heel from the new shoots when they were 5–8 in. long. These were tipped, dipped in hormone powder, rooted in acidified Perlite in a propagating case and sprayed weekly with Ra-Pid-Gro. Such cuttings rooted in 8 weeks and were fully mature by the autumn for overwintering in a cold frame. If pinched back the following June they were saleable by the second autumn. In districts with an earlier spring propagation under interrupted mist has proved even more satisfactory.

1762. McNally, A. G.
Malathion in control of leaf miners on arborvitae.
A.R. ent. Soc. Ont. 1956, 1957, p. 80.

In 1955 *Argyresthia* spp. caused considerable damage to arbor-vitae hedges and trees in the neighbourhood of Guelph, Ontario. A spray of 4 lb. 25% w.p. malathion per 100 gal. water applied on August 4 caused 97·1% mortality compared with 5·2% found on unsprayed areas. There was no evidence of phytotoxicity.—Ont. agric. Coll.

1763. Muthuswamy, S., and Lakshmanan, V.
A note on seed-setting in bougainvillea.
South Indian Hort., 1957, **5**: 35-7, bibl. 3, illus.

Among types of bougainvillea at Coimbatore only *B. spectabilis* and the white bougainvillea set seed; one plant of the latter produced 200 seeds in one season, of which 60% germinated. Although most seedlings started flowering within 6 months no seed was set until the plants were 2–4 years old. It appears that only the flowers produced between February and April are capable of setting seed.—Agric. Coll. and Res. Inst., Coimbatore. J.R.L.

1764. (Munnecke, D.)
Agrimycin controls *Dieffenbachia* rot.
Flor. Exch., 1957, **129**(14): 47.

Recommendations for controlling bacterial rot of *Dieffenbachia* are as follows: Healthy stock plants are sprayed with 200 p.p.m. Agrimycin 100 on the day before taking cuttings. Cuttings are taken with a disinfected knife, and are immersed in an Agrimycin solution for 20 min. before being set in a sterilized mixture. The best long-term control is the selection of propagation stock from healthy mother plants.—Univ. Calif., Los Angeles.

1765. Pešina, K.
Vliv arillu a doby výsevu na klíčení semen brslenu evropského (*Evonymus europaea* L.). **(The influence of the aril and time of sowing on seed germination in *Euonymus europaea*.** [Russian and English summaries ½ p. each.]
Preslia, 1957, **29**: 186-92, bibl. 20, illus.

The optimum period for sowing euonymus seeds coincides fairly closely with the time of bursting of the capsules. Germination was improved by removing the arils from the seeds, and seeds covered with a layer of leaves germinated better than seeds left uncovered.

1766. Aengenheister, J.
Ficussteckling in Verkaufsgrösse bewurzelt. **(*Ficus* cuttings rooted at saleable size.)**
Gartenwelt, 1958, **58**: 38-9, illus.

In the beginning of August a *Ficus decora* tree, 3·5 m. high, was decapitated just above the point at which the stem ceased to be lignified. After cleaning the cut surface the tip cutting, which was 1·2 m. long, was inserted in a pot containing a mixture of peat and sand, the whole being wrapped in a plastic film. After two months in a cold house the cutting had developed a good root system and after a further month in a temperate house without its wrap the plant was saleable.

1767. Baudendistel, R.
Chelated iron corrects chlorosis of gardenias.
Bull. N.Y. St. Flower Grs, 1957, No. 143, pp. 2-3.

Chelated iron (14 oz. per 100 sq. ft. of bench) was applied to gardenia plants growing at various soil and air temperatures. Chelate treatment had a marked effect on the number of leaves produced and on the correction of chlorosis, especially at 60° and 70° F. air temperatures. High soil and air temperatures (70° F.) without chelate treatment were not completely successful in correcting chlorosis. More flowers and buds were produced by chelate-treated plants than by untreated plants. Chlorosis was corrected even at a soil temperature of 50° F. by soil additions of chelate. Plants not treated with chelate remained chlorotic even at 60° F. during periods of low light intensity.

1768. Childers, J. T., and Snyder, W. E.
The effect of time of taking cuttings on the rooting of three cultivars of American holly (*Ilex opaca* Ait.).
Proc. Amer. Soc. hort. Sci., 1957, **70**: 445-50, bibl. 7.

Terminal cuttings of 3 cultivars of *Ilex opaca* were taken at fortnightly intervals from 1 August to 15 November. Some of the cuttings were treated with Rootone 10 (containing NAA) or Rootone 10+$KMnO_4$. The cultivar Arden rooted easily throughout the whole season, Old Hale and Hearty was moderately difficult to root, and Cumberland was extremely difficult to root. Maximum rooting of all cultivars occurred in cuttings taken on 1 September. Rootone 10 used alone damaged many of the cuttings, but used with $KMnO_4$ it caused little damage and often produced the highest percentage rooting and the heaviest root systems. No consistent relationship was found between rooting response and starch or carbohydrate contents of the cuttings at time of taking.—Rutgers Univ., New Brunswick, N.J.

1769. Brierley, P.
Virus-free hydrangeas from tip cuttings of heat-treated ringspot-affected stock plants.
Plant Dis. Reptr, 1957, **41**: 1005, bibl. 3.

When short tip cuttings were taken from hydrangea plants infected with hydrangea ringspot virus, that had been grown in a greenhouse for 12 or more weeks at 35° C., day and night, a proportion of the plants produced were free of the virus. The heat-treated stock plants remained infected, as did cuttings taken after the stock plants had been treated for only 4 and 9 weeks. So far, attempts to obtain healthy shoots from heat-treated hydrangeas carrying both tomato ringspot and hydrangea ringspot have been unsuccessful.—Agric. Res., Serv., U.S.D.A., Beltsville, Md.

1770. Asen, S., and Siegelman, H. W.
Effect of aluminum on absorption spectra of the anthocyanin and flavonols from sepals of *Hydrangea macrophylla* var. Merveille.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 478-81, bibl. 10.

The absorption spectra of the delphinidin diglycoside, kaempferol and the kaempferol triglycoside found in sepals of Merveille hydrangeas were determined alone and with the addition of Al. Al caused a marked shift in absorption maxima toward the longer wave lengths with a resultant color change from red to blue for the delphinidin diglycoside and from pale to bright yellow for the kaempferol compounds. The absorption spectral shifts are probably caused by the formation of five-membered rings on chelation with Al with adjacent hydroxyl or hydroxyl and carbonyl groups. The absorption maxima of a mixture of delphinidin diglycoside and kaempferol or kaempferol triglycoside were additive and there was no evidence of interaction. [Authors' summary. For earlier studies see *H.A.*, 27: 3800.] The various shades from red to blue found in the sepals of hydrangeas are probably a function of the Al concentration and of the ratios between the concentrations of anthocyanin and kaempferol pigments.—U.S. Dep. Agric., Beltsville, Md.

1771. Caprio, J. M.
Phenology of lilac bloom in Montana.
Science, 1957, **126**: 1344-5, maps.

A survey was made in Montana in 1956 of the date of first flowering and duration of the flowering period of common purple lilac, used as an indicator plant to obtain information on the climate and on plant development in the state. The results are plotted on maps. It was found that the date of flowering was retarded by about 1 day for every 20 miles distance northwards and for every 100 ft. increase in elevation.—Mont. agric. Exp. Stat., Bozeman.

1772. Griffith, E.
An interim report on *Metasequoia glyptostroboides.*
Nat. hort. Mag., 1957, **36**: 357.

Reports from various parts of the United States show that growth is limited to areas with a temperature range of −15° to 105° F., and that partial shade and a moist soil are desirable. Softwood cuttings taken during the summer will root readily.—U.S. Plant Introd. Gdn, Glenn Dale, Md.

1773. Box, C. O.
Poinsettia propagation.
Miss. Fm Res., 1957, **20**(6): 7, illus.

Poinsettia cuttings of 3 varieties taken in the early morning and rooted under alternating mist showed 8·33–11·03% higher rooting than cuttings taken during the warmest part of the day (about 2.30 p.m.).

1774. (Shanks, J. B.)
Smaller poinsettias in time for holidays.
Flor. Exch., 1957, **129**(16): 14.

A method of forcing small poinsettia cuttings in 3 in. pots for Christmas is outlined. Cuttings are taken in October, and rooted under continuous mist.—Univ. Md.

1775. Boodley, J. W.
Some effects of maleic hydrazide on poinsettias.
Diss. Abstr., 1957, **17**: 206, being *Publ.* 19,944 of 152 pp.

Young rooted cuttings taken in early summer were treated with MH at various concentrations, applied as foliar sprays or soil drenches at various intervals after potting up. Foliar sprays had no significant effects on linear growth, days to flowering, or flower size. Soil-drench applications generally resulted in a linear relationship between MH concentration and the degree of linear growth inhibition. Plants treated with MH soil drenches showed a loss of apical dominance, leaf thickening, and a high degree of chlorosis in older leaves. A soil drench of MH at 50 to 100 p.p.m. applied 10 or 14 days after potting generally increased the number of days to flowering and decreased flower size. Treatments made 28 days after potting decreased the number of days to flowering and increased flower size. When soil drench applications effectively inhibited linear growth, flowers were deformed or were not formed. It is suggested that several spray applications of MH throughout the growth period might result in a satisfactory degree of growth control. Soil drench applications of 50 and 100 p.p.m. MH produced no undesirable effects and appear to show the most promise for growing short poinsettias from early cuttings.—Pa St. Univ.

1776. (Widmer, R. E.)
Poinsettias preserved by growth regulators.
Flor. Exch., 1957, **129**(12): 13.

Sprays of *p*-chlorophenoxyacetic acid have shown promise for increasing the keeping quality of poinsettias. When kept for 3 weeks under unfavourable room conditions untreated plants lost 2 or 4 times as many bracts as treated plants.—Univ. Minnesota.

1777. Royal Horticultural Society.
The rhododendron and camellia year book, 1958, No. 12.
R.H.S., London, 1957, 9×5½ in., pp. 126, illus., 10s.+1s. 3d. postage, or U.S. $1.65 post free.

An account is given by G. H. Johnstone of the history of the Rhododendron Society, founded in 1915 and dissolved in 1951. Notes on the requirements and varieties of Ghent azaleas are given by D. Waterer. Rhododendron gardens described include those on the Isle of Gigha off the west coast of Scotland, at Westbourn near Virginia Water, and at Pylewell Park in

Hampshire. From Seattle, Wash., comes information on the effects of the severe winter of 1955 on various *Rhododendron* species. There are contributions on camellia growing and varieties from California, Virginia, New Zealand and Australia, and a note on the confusion in camellia nomenclature. Various British and American shows are reported.

1778. PRYOR, R. L.
Dwarf azalea hybrids.
Nat. hort. Mag., 1957, **36**: 295-301, illus.

Seedlings of species hybrid azaleas bred from Kurume ×Indian crosses were often very small. These have now been shown to make thrifty growth at a very slow rate, and produce a compact low spreading plant suitable for indoor use. The branching is horizontal, the leaves are variable in size, often being small, but the flowers are of normal size. The dwarf hybrids can be raised from cuttings.—U.S.D.A., Beltsville, Md.
J.R.L.

1779. JAKOVLEVA, V. A.
Azalea indica. [Russian.]
Priroda, 1957, **46**(8): 106-8.

Cultivation is outlined and 4 varieties suitable for propagation by cuttings are named. Trials at the main Botanical Garden, Moscow, have shown that semi-hardwood cuttings taken in June rooted more rapidly in sand but produced better root systems and more vigorous growth in conifer soil.

1780. PENNINGSFELD, F.
Azaleenernährung in Torf. (**Azalea nutrition in peat.**) [English, French and Spanish summaries 3 or 4 lines each.]
Mitt. Klosterneuburg, Ser. B, 1957, **7**: 320-5, illus.

Fertilizer studies with azaleas grown in peat have been carried out during 8 years at Weihenstephan, and some results are given. Basic applications of a 3 : 2 : 2 fertilizer were made at rates of ½–1 g. per litre of peat. Subsequent liquid feeding was determined according to variety, but the most satisfactory ratio was 3 : 1 : 2. In trials with various fertilizer forms, P. Schäme showed better bud initiation and earlier flowering with ammonium nitrate than with other forms of N. Hyperphos and basic slag were the best of the P fertilizers tested, and sulphate of potash and potassium magnesium sulphate the best forms of K. Excess Mn induced chlorosis, and excess B caused marginal chlorosis. [The same paper from another source was previously noted in *H.A.*, 28: 754c.]

1781. LENZ, H.
Azaleen-Düngungsversuche 1955 und 1956. (**Manurial trials with azaleas, 1955 and 1956.**)
Gartenwelt, 1958, **58**: 3-5, illus.

The effects were studied of several levels of mineral and mineral plus organic (brewers' grains, i.e. spent malt) nutrition on the growth and flowering of the azalea varieties Hexe and Paul Schäme. The use of mineral fertilizers alone gave the best results in both cases. The optimum development of Schäme was obtained with a 3% solution, while Hexe responded best to a 6% solution. Die-back became more pronounced as the quantity of brewers' grains was increased.—Inst. PflErnähr., Tech. Hochsch., Hannover.

1782. HAASE, W.
Bekämpfung der Mottenschildlaus, *Dialeurodes chittendeni* Laing, in Rhododendron-Kulturen. (**Control of rhododendron white fly on rhododendrons.**)
NachrBl. dtsch. PflSchDienst, Berlin, 1957, **11**: 225-6.

Low volume spray applications of a DDT/BHC aerosol, and a DDT emulsion were applied at the end of June to rhododendrons which were severely attacked by *Dialeurodes chittendeni.* Successful control was obtained until the autumn.

1783. BURGOS, J. C.
Tratamiento con ácido sulfúrico de semillas de la acacia blanca (*Robinia pseudo acacia* L.) cosechadas en Mendoza. (**Sulphuric acid treatment of seeds of white acacia *(Robinia pseud-acacia)* harvested in Mendoza.**) [English summary ½ p.]
Rev. Fac. Cien. agrar. Mendoza, 1956, **6**(1): 19-27, bibl. 7, [received 1958].

Seeds of *Robinia pseud-acacia* showed progressively more and quicker germination as their period of immersion in concentrated sulphuric acid was increased from 45 to 180 min. After 180 min. immersion the germination time was 8–13 days and the percentage was 90, whereas in untreated seeds the percentage was only 7·5.

1784. BOONSTRA, R., KENWORTHY, A. L., AND WATSON, D. P.
Nutritional status of selected plantings of *Taxus media hicksi.*
Proc. Amer. Soc. hort. Sci., 1957, **70**: 432-6, bibl. 13.

Samples of shoot tips were collected from *Taxus media hicksi* and analysed for 10 essential nutrient-elements. The analyses indicate that such samples may be used to diagnose nutritional needs of *Taxus.* Early spring, prior to growth, and mid-summer appear to be desirable periods for collecting samples. Variations in composition as influenced by location, age of plants, and time of sampling were studied. [Authors' summary.]—Mich. St. Univ., East Lansing.

Noted.

1785.

a AMICI FABRICATORE, J.
Le malattie delle piante ornamentali osservate in Italia. Dicotyledoneae. Parte quarta. (**Diseases of ornamental plants in Italy. Dicotyledons. Part 4.**) [English summary 7 lines.]
Ann. Sper. agrar., 1957, **11**(5), Suppl. pp. I–XLVII, bibls.
Bibliographical notes [see also *H.A.*, 27: 3815a and 28: 753a].

b AYCOCK, R.
Reduced decay of Dutch iris bulbs.
Res. and Fmg N.C., 1957, **16**(2): 9.
Terrachlor (pentachloronitro benzene) promising against crown rot (*Sclerotium rolfsii*).

c BAIRD, W. P.
Ornamental hedges for the Northern Great Plains.
Fmrs' Bull. U.S. Dep. Agric. **2105**, 1957, pp. 34, illus.
Varieties and their management.

d CONDIT, I. J.
Fig trees for ornamental planting.
Nat. hort. Mag., 1957, **36**: 252-9, bibl. 6, illus.
Over 30 *Ficus* spp. mentioned.

e FEINBRUN, N.
Chromosome numbers in the genus *Colchicum*.
From abstr. in *Bull. Res. Coun. Israel, Sect. B*, 1957, **6**: 283.
9 species investigated.

f GERLING, J.
Forms and varieties of Norway maple.
Amer. Nurserym., 1957, **106**(9): 7-8, 44-6, illus.
Acer platanoides.

g GRISERO, V.
La poinsettia. **(Poinsettia.)**
Ital. agric., 1957, **94**: 1149-50, illus.
Notes on varieties and culture.

h HARBORNE, J. B., AND SHERRATT, H. S. A.
Flavonoids of the Primulaceae. [3 papers.]
Nature, 1958, **181**: 25-7, bibls 12, 9 and 6.
Genetics and chemistry of the pigments.

i HODGE, W. H.
***Solanum quitoense* as an ornamental.**
Nat. hort. Mag., 1957, **36**: 365-7, illus.
As a greenhouse foliage plant, and its propagation.

j ISHII, M.
Nematodes infesting roots of orchids.
Hawaii Fm Sci., 1957, **6**(2): 12, illus.
Shown to be a minor problem, except where quarantine regulations must be met.

k JAKOVLEV, M. S., AND IOFFE, M. D.
Embryogenesis in the genus *Paeonia*. [Russian.]
Bot. Žurnal, 1957, **42**: 1491-502, bibl. 20, illus.

l JENKINS, J. M., JR.
Dry cold storage of Dutch iris.
Res. and Fmg N.C., 1957, **16**(2): 5, 9.
Flowers can be stored up to 30 days at 31° F.

m JUNG, J., AND STOLL, C.
Über die Hemmwirkung des Gynäzeums bei *Primula obconica* auf Bakterien und Pilze. I. Über Schwankungen der Hemm-Intensität. **(On the inhibitory action of the gynaeceum of *Primula obconica* on bacteria and fungi. I. Variations in the magnitude of the inhibitory action.)**
Phytopath. Z., 1957, **31**: 180-4, bibl. 7.

n KAMEMOTO, H.
Cytogenetics research—a valuable aid in orchid breeding.
Hawaii Fm Sci., 1957, **6**(2): 5-6, illus.

o KLINKOWSKI, M.
Ein Beitrag zur Symptomatologie und Problematik der Zierpflanzenvirosen. **(On the symptomatology and other problems of the viruses of ornamental plants.)**
Reprinted from *Anz. Schädlingsk.*, 1957, **30**: 33-7, illus.
A review.

p KRISTENSEN, H. R.
Nellike-viroser. **(Virus diseases of carnations.)** [English summary ½ p.]
Tidsskr. Planteavl, 1957, **61**: 718-36, bibl. 30, illus.
Dianthus barbatus the best test plant for carnation ringspot; heat treatment may be feasible.

q KUNITAKE, G. M., SALTMAN, P., AND LANG, A.
The products of CO_2 dark fixation in leaves of long- and short-day treated *Kalanchoë blossfeldiana*.
Plant Physiol., 1957, **32**: 201-3, bibl. 10.
See also *H.A.*, 27: 2088d.

r LANGHANS, R. W., AND MILLER, R. O.
Poinsettias for Christmas.
Bull. N.Y. St. Flower Grs, 1957, No. 141, pp. 1-2.
Recommendations on temperatures and photoperiods to control time of flowering.

s LAWRENCE, W. J. C.
Studies on *Streptocarpus*. IV. Genetics of flower colour patterns.
Heredity, 1957, **11**: 337-57, bibl. 4.
In garden forms and species hybrids.

t LAWRENCE, W. J. C., AND STURGESS, V. C.
Studies on *Streptocarpus*. III. Genetics and chemistry of flower colour in the garden forms, species and hybrids.
Heredity, 1957, **11**: 303-36, bibl. 14.
Including identification of the anthocyanins and anthoxanthins.

u LEE, F. P.
***Lycoris*.**
Nat. hort. Mag., 1957, **36**: 368-70, illus.
Notes on species.

v LEE, F. P.
Plantainlilies.
Nat. hort. Mag., 1957, **36**: 313-33, illus.
Descriptions and synonyms of *Hosta* spp., with notes on culture.

w LEE, R. E.
Flowers from seed.
Ext. Bull. Cornell Univ. **981**, 1957, pp. 16, illus.
Methods for annuals and perennials.

x MCCLINTOCK, E.
Hydrangeas.
Nat. hort. Mag., 1957, **36**: 270-9, bibl. 22, illus.
9 spp. and many subspp. considered.

y Mameli-Calvino, E.
Influenza delle gibberelline sullo sviluppo delle piante da fiore. **(Effect of gibberellins on the development of ornamental plants.)**
Ital. agric., 1957, **94**: 1127-33, bibl. 15.
A brief review of recent work.

z Matkin, O. A., and Chandler, P. A.
U.C. type soil mixes for container-grown plants.
Leafl. Calif. agric. Ext. Serv. **89**, 1957, 1 folded sheet.
Soil mixture formulae, taken from *Manual* 23 [*H.A.*, 28: 963].

1786.

a Menon, B. G. N., and Kuppuswamy, K. P.
The genus *Eucalyptus* on the Nilgiris.
South Indian Hort., 1957, **5**: 10-19.
Characters and uses of 36 spp.

b Milanez, F. R., and Machado, R. D.
Aplicação da microscopia electrônica ao estudo dos laticíferos embrionários de *Euphorbia pulcherrima* Willd. **(Application of electron microscopy to the study of embryonic latex tubes in *Euphorbia pulcherrima*.)**
Rodriguésia, 1956, No. 30/31, pp. 425-40, illus., [received 1958].

c Milanez, F. R., and Monteiro, H. (Neto).
Origem dos laticíferos do embrião de *Euphorbia pulcherrima*, Willd. **(Origin of latex tubes in the embryo of *Euphorbia pulcherrima*.)** [English and German summaries 1¼ pp. each.]
Rodriguésia, 1956, No. 30/31, pp. 351-424, bibl. 18, illus., [received 1958].

d Oliver, R. W.
Planning your garden.
Publ. Canada Dep. Agric. **795**, revised 1957, pp. 30, illus.
See also *H.A.*, 18: 553.

e Oliver, R. W.
Woody climbers and ground covers for Canadian gardens.
Publ. Canada Dep. Agric. **1017**, 1957, pp. 15, illus.
Species hardy at Ottawa briefly described.

f Robinson, R. A.
Air-layering trees and shrubs.
Gdnrs' Chron., 1958, **143**: 42, 45, illus.
Experience with various species outlined.

g Roig, F. A.
Arum italicum Mill. (Araceae), cultivado en Mendoza. **(*Arum italicum* cultivated in Mendoza.)**
Rev. Fac. Cien. agrar. Mendoza, 1955, **5**(2): 59-62, bibl. 7, illus., [received 1958].
Including brief cultural notes.

h Romanov, I. D.
The embryo sac in the genus *Tulipa*. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1957, **115**: 1025-7, bibl. 25.
Differences among 28 species.

i Rünger, W.
Über die Langtagsbehandlung der Blattstecklinge von Lorrainebegonien. **(On the long-day treatment of leaf cuttings of Lorraine begonias.)**
Gartenwelt, 1958, **58**: 39-40, bibl. 4, illus.
Practical suggestions [for experimental work see abstracts 1719 and 1720].

j Saltman, P., and others.
The dark fixation of CO_2 by succulent leaves: metabolic changes subsequent to initial fixation.
Plant Physiol., 1957, **32**: 197-200, bibl. 26.
In *Bryophyllum* leaves [see also *H.A.*, 27: 2088d].

k Sauthoff, W., and Gerlach, W.
Die Fusarium-Welke der *Aechmea fasciata*—eine neue Pilzkrankheit. **(*Fusarium* wilt of *Aechmea fasciata*—a new fungus disease.)**
Gartenwelt, 1957, **57**: 389-90, illus.
Über eine bisher nicht bekannte Fusarium-Welkekrankheit an *Aechmea fasciata* (Lindl.) Bak. **(On a new *Fusarium* wilt disease of *Aechmea fasciata*.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1958, **10**: 1-3, illus.
Soil-borne *F. bulbigenum* f. *aechmea*; sanitary measures advised for control.

l Scaramuzzi, G., and Corte, A.
La maculatura lineare del ciliego da fiore. **(Line pattern disease of flowering cherry.)** [English summary ¼ p.]
Atti Ist. bot. Univ. Pavia, 1957, **14**: 351-61, bibl. 17, illus.
For a shorter account see *H.A.*, 28: 249.

m Tandon, S. L., and Bali, P. N.
Abnormal (apetalous unisexual) flowers in colchicine treated *Iberis amara* L.
Sci. and Cult., 1957, **23**: 317-18, illus.

n Ueno, K., and Kawaguchi, T.
Experiment on breeding *Lilium speciosum* (No. 1). [Japanese, with English summary 12 lines.]
Bull. Kanagawa agric. Exp. Stat. hort. Branch, 1957, No. 5, pp. 69-72, bibl. 5, illus.
By selection of individuals.

o U.S. Department of Agriculture.
Gardenia culture.
Leafl. U.S. Dep. Agric. **199**, 1957, pp. 8.
Outdoor and greenhouse culture, with notes on control of diseases and pests.

p Vickery, H. B.
The formation of starch and the behavior of isocitric acid in excised leaves of *Bryophyllum calycinum* cultured in darkness.
Plant Physiol., 1957, **32**: 220-4, bibl. 11.
An extension of work described in *H.A.*, 27: 2030.

q Warburg, E. F.
Crocuses.
Endeavour, 1957, **16**: 209-16, bibl. 8, illus.
Evolution and classification discussed.

r WILL, H.
Erfahrungen in der Blumenzwiebeltreiberei. **(Methods of bulb forcing.)**
Gartenwelt, 1957, **57**: 393, illus.
Beneath glasshouse benches with artificial lighting.

s WILLIAMS, N. D.
Effects of incorporated radiocarbon, C^{14}, on somatic flower-color variations and morphological changes in the snapdragon, *Antirrhinum majus*.
Diss. Abstr., 1957, **17**: 219, being *Publ.* 17,369 of 97 pp.

SUB-TROPICAL FRUIT AND PLANTATION CROPS.

General.

(*See also* 1089, 2045.)

1787. CASELLA, D.
Prosperano anche in Italia fruttiferi subtropicali. **(Subtropical fruit species grow well in Italy.)**
Frutticoltura, 1955, **16**: 23-37, illus., [received 1958].

The director of the Institute for Fruitgrowing at Portici, University of Naples, describes briefly the general characters and the extent to which they are grown in Italy of the following species: the cherimoya (*Annona cherimola*), banana (*Musa* spp.), Natal plum (*Carissa grandiflora*), white sapote (*Casimiroa edulis*), the cactus (*Cereus jamacaru*), tree tomato (*Cyphomandra reticulata*), rose apple (*Eugenia jambos*) and Surinam cherry (*E. michelii*), feijoa (*F. sellowiana*), passion fruit (*Passiflora edulis* and *P. mollissima*), pecan (*Hicoria pecan*), avocado (*Persea drymifolia*), guava (*Psidium* spp.) and melon pear (*Solanum muricatum*).

Avocadoes.

(*See also* 1840k, 1841a, k.)

1788. LABANAUSKAS, C. K., EMBLETON, T. W., AND JONES, W. W.
Effects of nitrogen on micronutrients in avocado leaves.
Calif. Citrogr., 1957, **43**: 67-9.

In an experiment started in 1951 Fuerte avocado trees received N in 2 forms, viz. ammonium nitrate at 2 levels (nil for 5 years and 0·5 lb. N per tree for 2 years *vs.* 2 lb. N per tree for all 7 years) and steer manure applied as a mulch to provide 2 lb. N per tree per year. Leaf analyses made in the last 2 years showed that 2 lb. N as ammonium nitrate had, directly or indirectly, caused significant reductions in Zn, Cu and B, whereas 2 lb. N in the steer manure was associated with increases in the same 3 elements. The reverse was true of Mn. Fe showed no consistent trends.—Univ. Calif., Riverside.

1789. LABANAUSKAS, C. K., EMBLETON, T. W., AND JONES, W. W.
Effects of phosphate on micronutrients in avocado leaves.
Calif. Citrogr., 1958, **43**: 133-4.

In 1939 Fuerto avocado trees were planted in an area on which oranges had failed because of P deficiency. In 1951 and again in 1952 the avocado trees received P at 3 levels, namely, 0, 10 and 20 lb. treble superphosphate per tree. These treatments were combined factorially with N treatments. Up to 1957 the P applications had had no effect on yields, but leaf analyses made in 1955, 1956 and 1957 showed that P had reduced, directly or indirectly, the Zn and Cu concentrations and had increased the Mn concentration in the leaves. Fe and B concentrations were not influenced by P.—Univ. Calif., Riverside.

Citrus—general.

(*See also* 1840i, o, q, v, 1841j, 1999j, 2016, 2039, 2040.)

1790. BURKE, J. H.
Citrus industry of Southern Africa.
Foreign Agric. Rep. U.S. Dep. Agric. **103**, 1957, pp. 89, illus.

This report includes information on the more important producing areas, marketing, costs and returns, processing, and the future outlook, particularly as regards competition with the United States.

1791. ANON.
Progress report of Citrus Exchange Technical Department.
Citrus Gr, 1957, No. 288, pp. 6-8.

Trial shipments and local disposal of Meyer lemons indicated that this variety was in poor demand. Trials of waxes for shipped fruit showed that waxing tended to increase waste, largely from *Botrytis* rot, but reduced weight loss and provided a higher gloss than that on untreated fruit. Grey mites were controlled by Kelthane (18·5% w.p. at 1½ lb. per 100 gal.) and Chlorobenzilate (25% w.p. at 1½ lb. per 100 gal.); lime sulphur had less residual effect. In a fertilizer trial it was found that 1½ lb. per tree per year of N was the optimum dressing, and that P and K applied separately and alone had no effect on yield but depressed yield when applied together. No treatment affected fruit size but high N increased acid content.

1792. MOORE, P. W.
Pruning machines for Citrus.
Calif. Citrogr., 1957, **43**: 44, 52-6, illus.

Machines developed recently for topping and hedging citrus and other fruit trees are described briefly and illustrated. They include 3 topping machines, one equipped with a reinforced sickle-bar mower blade and two equipped with circular saws, and 2 hedgers equipped with circular saws, one of which has a boom which can be tilted to make a sloping cut at up to 15° from the vertical. In addition there are mobile pruning towers, which can be raised to 12 ft. above the ground, and a variety of pneumatic and electric shears and saws. Experiments have shown that mechanical pruning can result in considerable savings in costs as compared with hand pruning. The effects of hedging and topping on fruit yields have generally been good, although in the first year after pruning yields have in some cases been below those of comparable hand-pruned trees. Mechanical pruning does not obviate the need to remove dead wood and suckers from the inside of the tree, but whether it is necessary to do this following each hedging operation, as is current practice for lemons, remains to be determined.—Univ. Calif., Riverside.

Citrus—rootstocks.

(*See also* 1808, 1809, 1811, 1821, 1840c, d, h, l, n, u, y, 1841e, f.)

1793. Cooper, W. C., and others.
Orchard performance of young trees of red grapefruit on various rootstocks in Texas.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 213-22, bibl. 5.

Red grapefruit trees were grown on rootstocks of 92 citrus species, hybrids and varieties in the Rio Grande Valley of Texas. Three groups of rootstocks were recognized: those sensitive to xyloporosis virus, those sensitive to exocortis virus, and those insensitive to both viruses. The presence of these two viruses in the budwood source eliminated all rootstocks sensitive to xyloporosis and exocortis that otherwise might be desirable. The limiting factors in the rootstock group insensitive to these viruses included salt, boron, lime and cold. Rootstocks apparently adapted to non-calcareous, non-saline soils included sour orange, Cleopatra and Ponkan mandarins, Calashu (calamondin-mandarin hybrids), Savage and Uvalde citranges, Citrumelo C4475, Citremon C46216, Precoce sweet orange, Webb Red Blush grapefruit, African shaddock and Bigaraldin (sour orange-calamondin hybrid). Rootstocks adapted to calcareous soil were sour orange and Cleopatra mandarin, while only *Severinia buxifolia* appeared adapted to highly saline soil. [From authors' summary.]—U.S. Dep. Agric., and Texas agric. Exp. Stat., etc.

1794. U, H.-L., and Hao, S.-C.
Preliminary communication on trials comparing grafts of the Fenchow mandarin on different rootstocks. [Chinese.]
Acta agric. Sinica, 1956, 7(3): 365-76, from *Ref. Ž.* (*Biol.*), 1957, No. 14, *Abstr.* 60,851.

In 1954 at Hangchow, Chekiang, the suitability of several rootstocks for the Fenchow mandarin (*Citrus reticulata*) was studied. The best take in the nursery was obtained on *Citrus grandis* × *C. ichangensis* and *C. reticulata* × *C. ichangensis*, but it was still over 78% on *Poncirus trifoliata*, *C. sinensis* × *P. trifoliata* and *C. aurantium*. The most frost resistant trees were produced on *P. trifoliata*, and the next on *C. sinensis* × *P. trifoliata*. Vigour was greatest on *C. sinensis* × *P. trifoliata*, followed by *P. trifoliata*, *C. reticulata* × *C. ichangensis* and *C. grandis* × *C. ichangensis*, which were about equal. *C. aurantium* produced the least vigorous trees. The largest number of branches was produced on *P. trifoliata*, the smallest number on *C. grandis* × *C. ichangensis*. The most vigorous root system was developed by *C. reticulata* × *C. ichangensis* and *C. grandis* × *C. ichangensis*, followed, in descending order, by *C. sinensis* × *P. trifoliata*, *P. trifoliata* and *C. aurantium*. For the Hangchow area *P. trifoliata* appears to be the most suitable rootstock for the mandarin, while *C. sinensis* × *P. trifoliata* is also considered safe.

1795. Giacometti, D. C.
Diferenciacão entre cinco tipos de limão rugoso. **(Distinction between five types of rough lemon.)** [English summary ½ p.]
Rev. Ceres, 1957, **10**: 111-18, bibl. 9, illus.

Florida rough lemon, Cravo lemon (Rangpur lime) and the 3 Brazilian types, Deodoro, Nacional and Limeira, are compared as rootstocks with particular reference to differences in susceptibility to scab, tristeza, exocortis and stem pitting.

1796. Baines, R. C., and others.
Troyer citrange and trifoliate orange for replants.
Calif. Citrogr., 1957, **43**: 70-1.

Troyer citrange and many selections of trifoliate orange are highly resistant to *Phytophthora* brown rot, citrus nematode and tristeza virus. In replanting old citrus land, preplanting soil fumigation can safely be omitted when trifoliate orange is used as the rootstock and also possibly in some cases where Troyer citrange is used. Troyer citrange should not be planted on wet soils and trifoliate orange on saline or alkaline soils. Both stocks are incompatible with Eureka lemon, and trifoliate orange generally has an excessively dwarfing effect on Lisbon lemons and grapefruit.—Univ. Calif., Riverside.

1797. Serafimov, S., and Bogdanov, I.
Production of citrus planting material. [Bulgarian, with English and Russian summaries.]
Nauč. tr. M-vo Zemed. Ser. Rastenievădstvo, 1956, **1**(2): 17-24, from *Ref. Ž.* (*Biol.*), 1957, No. 14, Abstr. 60,843.

It was shown in Bulgaria in 1953 that citrus grafts can survive outdoors even at temperatures of −17·5° C. Washington Navel and Pervenec oranges, Novogruzinski lemon and Unshiu mandarin were budded on seedlings of lemon, orange and trifoliata, and in November were earthed up to 20–25 cm., which later settled to 7–10 cm. The grafts on trifoliate orange overwintered the best (100%), then those on orange (0–60%), while those on lemon were killed.

Citrus—soil management, nutrition and tree composition.

(*See also* 1065, 1840a, m, p, 1841i.)

1798. Norris, R. E., and Smith, P. F.
Cultivation trials in a young, bearing grapefruit grove on sandy ridge soil.
Citrus Ind., 1957, **38**(11): 22-4, bibl. 1.

A 7-year cultivation trial was carried out to compare the effects on grapefruit yields of clean cultivation throughout the dry season, minimum cultivation by 1 or 2 annual rotary choppings, and autumn ploughing plus minimum cultivation. There were no significant yield differences between treatments in light-crop years. In heavy-crop years the heaviest yields were obtained from minimum cultivation; the other 2 treatments differed little in their effect on yield.

1799. Reuther, W., and others.
Responses of Valencia orange trees to timing, rates, and ratios of nitrogen fertilization.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 223-36, bibl. 16.

Results obtained from a fertilizer experiment with young bearing Valencia oranges, on deep, acid, sandy soil in central Florida, are summarized for an 8-year period. The effect of timing of N applications (split applications in autumn, bloom period and late spring, or single applications in autumn or bloom period) on yield varied significantly in some seasons, but the overall average yield was about the same for all 3 timing treatments. There was no overall effect of N rate or of N : PK ratio on yield. Split application resulted in a slightly larger trunk girth than either of the single applications, and a high rate of N fertilization (3·4 lb. per tree per year) produced slightly more growth than the normal rate (1·7 lb.). There was no differential effect of the N : PK ratio on growth. In general a single spring application of N and the higher rate of N produced the highest concentration of N in the leaves throughout the year. The higher rate of N applied in 1 dose in autumn hastened full bloom by 2–7 days compared with applying N at the lower rate in spring; other treatments had intermediate effects. In general, the effects of N treatments were strongly influenced by season, and no predictable effect of economic significance was noted.—U.S. Dep. Agric., Orlando, Fla.

1800. Ford, H. W., Reuther, W., and Smith, P. F.
Effect of nitrogen on root development of Valencia orange trees.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 237-44, bibl. 17.

Two long-term experiments were carried out to study the root distribution of bearing orange trees in sandy soil as influenced by rate and time of N fertilization. [For a preliminary account of this work see *H.A.*, 27: 3837.] In one location the high N plots (with N in excess of recommended levels) had 37% less feeder roots (by weight) than the low N plots to a depth of 5 ft. Neither K nor Mg had any appreciable effect on root development. High N levels also depressed rate of tree growth. At the other location the high N plots had 38% less feeder roots in the zone 5–35 in. in depth than the low N plots. There were no significant differences in yield or tree size due to high N. Neither time of application nor fertilizer ratio was a factor in the shift in root concentration associated with high N.—Fla Citrus Exp. Stat., Lake Alfred, and U.S. Dep. Agric., Orlando, Fla.

1801. Pratt, P. F., Jones, W. W., and Bingham, F. T.
Magnesium and potassium content of orange leaves in relation to exchangeable magnesium and potassium in the soil at various depths.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 245-51, bibl. 7.

The K content of leaves was significantly correlated with the exchangeable K in the soil of 0–6, 6–12, 12–24, and 24–36 inch depths. The correlation coefficient for the 24–36 inch depth of soil was lower than that for the other soil depths. The Mg content of leaves was significantly correlated with the K/Mg ratio in 12–24, 6–18, 24–36, and 18–30 inch depths of soil but not in 0–6 or 6–12 inch depths. The K/Mg ratio suggestive of Mg-deficient leaves was found to decrease with increase in depth of soil. [From authors' summary.]—Univ. Calif., Riverside.

1802. Koto, M., and Takeshita, S.
Experiments on leaf analysis of Satsuma orange. No. 3. Leaf analyses of manganese- and magnesium-deficient Satsuma orange trees in Kanagawa prefecture. Part 1.
[Japanese, with English summary ¼ p.]
Bull. Kanagawa agric. Exp. Stat. hort. Branch, 1957, No. 5, pp. 13-22, bibl. 34.

Symptoms of Mn deficiency in Satsuma orange trees were observed when the leaf Mn content was less than 30 p.p.m. The critical Mg content in the leaves was 0·3%. Leaf Mn contents were low on sandy soils, while on clay soils and volcanic lava soils Mn contents were high. Mg contents were high on clay soils and low on volcanic lava soils. In general, leaf contents of Mn and Mg were low on volcanic ash soils, and the level appeared to be affected by cultural conditions. Tree age, vigour and bearing did not affect leaf contents of Mn and Mg. Leaf contents of Mg and K and of Mg and N were negatively correlated. Leaf Mn contents were positively related to the P content and negatively related to the K content. [For No. 2, Part 1, see *H.A.*, 27: 1811.]

1803. Bradford, G. R., and Harding, R. B.
A survey of microelements in leaves of forty-three high-producing orange orchards in southern California.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 252-6, bibl. 7.

This survey showed that high production was being maintained with what had hitherto been considered less than the minimum requirement of several essential micro-elements, namely Cu, Fe, Mn and B. Contents of B, Fe and Mn tended to increase with age of the leaf, whereas Cu and Sr tended to decrease.—Univ. Calif. Citrus Exp. Stat., Riverside.

1804. Sulakadze, T. S., and Črelašvili, M. N.
Variations in the content and composition of pigments in lemon and orange leaves in relation to trench cultivation. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1957, **117**: 519-22, bibl. 16.

Little difference in colour was observed between the leaves of orange and lemon trees overwintered in a darkened trench and the autumn and spring foliage of similar trees overwintered outdoors. Analysis, however, showed a reduction in chlorophyll and an increase in carotene in the leaves of the trenched trees. An increase in the carotene : xanthophyll ratio was accompanied by a loss of carbohydrate through respiration.

Citrus—growth stimulation and pollination.

1805. Brusca, J. N., and Haas, A. R. C.
Organic chemicals on citrus.
Calif. Agric., 1957, **11**(11): 4, illus.

Several chemically pure salts of organic compounds were added to nutrient solutions supplied to Prior

Lisbon lemons grown in sand culture. Pronounced growth stimulation followed the addition of 0·05 p.p.m. 2,4-D and of 50 to 200 p.p.m. esculin. Growth was also stimulated in cultures to which vitamin B_{12} was added at 0·02 g. per plant and to which vitamin B_6 hydrochloride was added at 0·01 g. and 0·02 g. The effects of supplying the plants with d-xylose at concentrations of 100 to 500 p.p.m. were slight.—Univ. Calif., Riverside.

1806. Fujita, K.
The effect of honey bees on the fruiting and appearance of Satsuma oranges. [Japanese, with English summary 18 lines.]
Bull. Kanagawa agric. Exp. Stat. hort. Branch, 1957, No. 5, pp. 1-4, illus.

Trees were covered by cheesecloth and bees allowed to work inside during flowering in some cases. The percentage fruit set was increased by bees; only slight damage to the fruits by bees was observed.

Citrus—diseases and pests.

(*See also* 1368j, 1840e, h, l, r, t, u, x, y, 1841b, l, m.)

1807. Knorr, L. C., Suit, R. F., and DuCharme, E. P.
Handbook of citrus diseases in Florida.
Bull. Fla agric. Exp. Stats **587**, 1957, pp. 157, bibl. 5, illus.

This liberally illustrated handbook is based in part on previous bulletins, including Nos. 229 and 463. The word "diseases" is used in its widest sense to include troubles due to frost and waterlogging, certain nutrient deficiencies, parasitic plants, nematodes and even 2,4-D, as well as those diseases caused by fungi, bacteria and viruses. In all, 50 diseases and disorders are covered, their symptoms, cause and control being dealt with in each case.

1808. Carpenter, J. B.
Further studies on tristeza in Meyer lemon in Arizona.
Plant Dis. Reptr, 1957, **41**: 1014-15, bibl. 4.

As in a previous survey all trees of Meyer lemon tested were found to be carrying tristeza. In transmission tests by bud inoculation 6 other varieties of citrus all proved susceptible to the virus. Of the two rootstocks used Ponderosa lemon developed tristeza symptoms but rough lemon did not.—U.S. Dep. Agric., Indio, Calif.

1809. Mason, W. B.
A review of the lime industry.
Ghana Fmr, 1957, **1**: 179-80.

Seedling limes succumbed to tristeza, and, subsequently, many limes budded on rough lemon stocks showed decline within 6 years. Trials of other rootstocks, including Cleopatra tangerine, are in progress.

1810. Grant, T. J.
Heat treatments for obtaining sources of virus free budwood.
Citrus Ind., 1957, **38**(11): 20-1, bibl. 8, illus.

In further studies [see *H.A.*, 27: 2788] tristeza-infected Key lime plants were cut back to 6 in. and treated in a heat-chamber at 98–104° F. After 86–100 days virus in all the tissues tested had been inactivated, the effect being faster in young than in old tissue. After a return to greenhouse conditions some virus symptoms reappeared indicating that virus inactivation in the lower portions was incomplete. Nevertheless, heat treatment is considered to show promise for obtaining virus-free budwood.—U.S. Dep. Agric., Orlando, Fla.

1811. Klotz, L. J., and DeWolfe, T. A.
Possible solution for a basic disease problem.
Calif. Citrogr., 1958, **43**: 80, 85, bibl. 1.

All the rootstocks so far found to be resistant to tristeza are susceptible to brown rot gummosis (*Phytophthora* spp.) with the exception of some trifoliate selections. Among these trifoliate selections are two which have recently also been found to show resistance to fibrous root rot caused by the same gummosis fungi followed by secondary organisms. The importance of this finding lies in the fact that all other rootstocks tested, including the sour orange, are susceptible to this form of attack, which is probably responsible for much of the deterioration apparent in many old Californian orchards. The use of trifoliate stock, however, necessitates using exocortis-free budwood, and at present supplies of both stocks and budwood are inadequate. In cases where it is necessary to plant tristeza-resistant, but gummosis-susceptible, stocks on old citrus land, it is important to ensure that both plants and soil are free from gummosis organisms. For soil treatment the best compounds found so far are vapam and mylone, but because of their cost it is suggested that only the tree sites should be treated in a circle 8 ft. in diameter. The trees can be planted one month after treatment. To help to avoid recontamination by rain or irrigation water the soil can subsequently be treated with bordeaux mixture or other neutralized copper fungicides.—Univ. Calif., Riverside.

1812. Bitancourt, A. A.
O cancro cítrico. **(Citrus canker.)**
Franco do Amaral, S.
Providências para a erradicação do cancro cítrico. **(Measures for eradicating citrus canker.)**
Biolôgico, 1957, **23**: 101-11, bibl. 20, and 112-23, illus.

Citrus hosts attacked by the A and B strains of *Xanthomonas citri* are listed. Symptoms are distinguished from those of verrucosis (*Elsinoë australis* and *E. fawcetti*), anthracnose (*Gloeosporium limetticolum*) and leprosis (a virus transmitted by mites). Protective legislation in various countries is outlined. Control is difficult and costly, usually necessitating spraying with bactericides and insecticides to control the vectors immediately before each bud-burst. With grapefruit and limes treatment is almost useless. The second paper discusses legislation and the destruction of diseased material in São Paulo, Brazil.

1813. Suit, R. F., and Brooks, T. L.
Current information relating to barriers for the burrowing nematode.
Citrus Ind., 1957, **38**(11): 10-12, 21.

No really effective barrier to prevent the spread of the burrowing nematode has yet been found, but the following suggestions are based on experience gained in tests. The barrier should be 100 ft. wide and should be treated at 6-monthly intervals with a mixture of 90 gal. DD and 10 gal. Nemagon, alternating with 100 gal. DD. Weed killer should be applied to the centre of the barrier, and cultivation across it should be kept to a minimum.—Fla Citrus Exp. Stat., Lake Alfred.

1814. RENNINGER, G., AND SOKOLOFF, B.

The experimental studies on citrus nematodes.

Citrus Ind., 1957, **38**(12): 9-11, 18, bibl. 15, illus.

Soil surface sprays of 1% and 1·5% of a water-soluble, hydrogenated fish oil, with antifungal activity, reduced the number of living nematodes (*Radopholus similis*) by about 90–92%. The oil was not toxic to citrus seedlings. In a pilot test the application of hydrogenated fish oil combined with piperazine citrate hydride reduced nematode populations to about 3·5% in the upper 6 in. of soil, and to 0·75% in a zone 42 in. deep. A pumping sprayer has been constructed for injection to depths of 8–12 feet.—Fla south. Coll., Lakeland.

1815. ABRAHAM, E. V.

A note on the control of the citrus butterfly, *Papilio demoleus* L.

South Indian Hort., 1957, **5**: 25-9, bibl. 3, illus.

In 3 trials BHC, malathion and Folidol sprays were more effective in controlling caterpillars of the citrus butterfly than were BHC dust and DDT, aldrin, dieldrin and calcium arsenate sprays. DDT encouraged the multiplication of mites. Malathion and Folidol appeared to have a residual toxicity lasting about 2 weeks. J.R.L.

1816. GUILLEMENET, R.

Aceria sheldoni Ewing, l'acarien des bourgeons d'agrumes existe-t-il au Maroc? **(Does *Aceria sheldoni*, the citrus bud mite, occur in Morocco?)**

Fruits et Prim., 1957, **27**: 263-7, bibl. 11, illus.

A bud mite, thought to be *A. sheldoni*, has been observed on citrus in Morocco. Damage is more serious in nurseries than on adult trees. The use of insecticides which would destroy the predators of the mite is deprecated. Spraying with white oil is suggested. In the nursery Aramite and chlorobenzene sulphonate showed promise.

1817. ELMER, H. S., AND JEPPSON, L. R.

Biology and control of the citrus flat mite.

J. econ. Ent., 1957, **50**: 566-70, bibl. 5, illus.

From the results of experiments and from observations on commercially sprayed groves it became apparent that organic phosphorus compounds did not reduce citrus flat mite (*Brevipalpus lewisi*) populations to the low level desired. The 2 chlorinated hydrocarbons Kelthane and Chlorobenzilate were the most effective materials tested. A dosage of 5 pt. of 18·5% Kelthane emulsifiable concentrate was as effective as a dosage of 10 pt. of 25% Chlorobenzilate emulsifiable concentrate, each in 250 gal./acre.—Univ. Calif., Riverside.

1818. DI MARTINO, E.

Impiego di esteri fosforici da soli e di miscele con oli bianchi nelle prove di lotta contro le cocciniglie degli agrumi nella Sicilia orientale durante gli anni 1953–54. **(Use of phosphoric esters, alone and mixed with mineral oils, in tests for the control of citrus scale insects in eastern Sicily during the years 1953 and 1954.)** [English summary 1¼ pp.]

Ann. Sper. agrar., 1957, **11**(5), Suppl. pp. CLIII-CLXXVII, bibl. 15, illus.

Parathion at 50 c.c., malathion at 125 c.c. and a diazinon product at 150 or 250 c.c. per 100 l. gave fairly good control of citrus scales, including *Chrysomphalus dictyospermi*, but their action was markedly improved by the addition of 1% mineral oil. Parathion was suitable for oranges, but not for lemons, on which it favoured the increase of red spider mite (*Tetranychus telarius*).

1819. CRESSMAN, A. W.

Light oil with parathion or malathion for control of black scale on oranges.

J. econ. Ent., 1957, **50**: 593-5, bibl. 7.

Sprays of 1% of a special light oil plus parathion or malathion were compared with 1·8% light medium oil alone and with malathion for control of black scale, *Saissetia oleae* (Bern.), on oranges in California. One per cent of light oil with 0·12 or 0·15 lb. of parathion or 0·25 lb. of malathion was as good as the 1·8% of light medium alone or with malathion on black scale, but less effective on the citrus red mite, *Metatetranychus citri* (McG.). Control of light infestations of California red scale, *Aonidiella aurantii* (Mask.), was satisfactory. The light oil combination had little effect on the appearance of the fruit and did not accentuate water rot in navel oranges. [Author's summary.] —Agric. Res. Serv., U.S.D.A.

Citrus—fruit characteristics and storage.

(*See also* 1840s, 1841g.)

1820. ERICKSON, L. C.

Compositional differences between normal and split Washington Navel oranges.

Proc. Amer. Soc. hort. Sci., 1957, **70**: 257-60, bibl. 6, illus.

The number of split Washington Navel oranges on 20 trees in each of 7 orchards was found to range from 0·8 to 24 fruits per tree. The moisture content of both peel and pulp was significantly lower in split fruit than in normal fruit, probably as a result of the splitting. The peel of split fruit contained significantly more P and N than that of normal fruit; differences in Ca, K, Mg and Na were not significant. The pulp of split fruit contained significantly more Ca than that of normal fruit; differences in K, Mg, Na, N and P were not significant. [From author's summary.] —Univ. Calif., Riverside.

1821. ERICKSON, L. C.

Oranges on lemon trees.

Calif. Citrogr., 1958, **43**: 100-4, bibl. 2, illus.

Following preliminary studies in which developing sweet lemon fruits were grafted onto sour lemon plants [*H.A.*, 27: 3869], 12 Valencia and 12 Washington Navel fruits, with short stems attached, were grafted on

July 18 onto Ross Eureka lemon plants growing in a greenhouse. Although initially most of the scions united with the stock, only 4 of the Valencia fruits resumed growth. During the following winter the grafted fruits remained green, whereas comparable fruits in the orchard turned orange. From April 22 to June 22 two of the grafted fruits were subjected to 9-hour photoperiods and a night temperature of 38°–40° F., but this did not hasten colour changes as compared with the other grafted fruits which remained in the greenhouse at a minimum night temperature of 60° F. The grafted fruits were finally picked on August 8. At this stage they were as large as the orchard fruits, with peel of similar thickness but rougher and paler in colour. The percentage of total soluble solids in the juice of the grafted oranges was markedly lower than that of the orchard fruits, as were the soluble solids : acid ratio and the percentage of sugars. The grafted fruit that had been subjected to low temperatures had a lower soluble solids : acid ratio than the grafted fruit that had been kept at higher temperatures.—Univ. Calif., Riverside.

1822. TURRELL, F. M., AND PERRY, R. L.
Specific heat and heat conductivity of citrus fruit.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 261-5, bibl. 21.

There were no significant differences in the specific heats of Marsh grapefruit, Eureka lemon and Valencia or Washington Navel oranges, the values ranging from 0·84 to 0·89 Cal g^{-1} °C^{-1}. The thermal conductivity coefficients were relatively low, the average for all varieties tested being 0·23 Btu/hr/ft^{2} (°F./ft). The data suggested a negative correlation between thermal conductivity coefficients and fruit volume, probably associated with peel thickness.—Univ. Calif., Riverside and Los Angeles.

1823. YUKAWA, I., TAKAHASHI, K., AND SUZUKI, Y.
Experiments on wax coatings for stored Satsuma oranges. The effects of waxing on appearance and quality. [Japanese, with English summary 16 lines.]
Bull. Kanagawa agric. Exp. Stat. hort. Branch, 1957, No. 5, pp. 5-12.

The effects of several waxes applied in water on orange quality were studied. Weight loss was slight in fruits waxed with Super Fresh wax, and rot occurrence was low in fruits treated with Fruit wax. In waxed fruits there was a relatively high proportion of black discoloration of the calyx and shrivelling of the skin. Prima Fresh and Super Fresh waxes improved the appearance of the oranges.

1824. ULRICH, R., AND LEBLOND, C.
Expériences de laboratoire sur la désodorisation des parois des chambres froides utilisées à l'entreposage des agrumes. (Désodorisants chimiques; enduits pour parois.) **(Laboratory experiments on the deodorization of the interior surfaces of cold rooms used for the storage of citrus fruits. (Chemical deodorants; coatings for the interior.))**
Rev. gén. Froid, 1956, **33**: 179-83, from *Food Sci. Abstr.*, 1957, Vol. **29**, No. 1877.

Apparatus was devised for testing the extent to which (1) materials normally used for the walls and floors of cold rooms give off odours (tested by absorption in mineral oil), (2) such materials absorb the volatile constituents of citrus fruits, and (3) such absorbed volatiles are removed by liquid and gaseous deodorants. It was found that citrus volatiles penetrate deeply into ordinary cement and cannot be removed by deodorants. A series of tests led to the following conclusions: Walls and ceilings are best treated with 2 coats of polyvinyl acetate dissolved in ethanol, or with Flintkote covered with special aluminium paint; these materials are odourless, and do not absorb odours. The materials recommended for floors are asphalt, or cement with chemical additives (Decolith). For complete deodorization of cold rooms after storage of citrus fruits, the interior surfaces should be washed with calcium hypochlorite or formaldehyde solution, or the rooms should be treated with air containing 20 p.p.m. of ozone for 3 hours, followed by thorough airing.

1825. BÖHME, H., AND BERTLING, L.
Zur Bestimmung von Diphenyl in Citrusfrüchten. **(The determination of diphenyl in citrus fruits.)**
Z. Lebensmitt.-Untersuch. u. -Forsch., 1957, **105**: 311-18, from *Food Sci. Abstr.*, 1957, Vol. **29**, No. 1968.

Diphenyl has a characteristic absorption spectrum at 250 μ, which can be measured after the removal of certain volatile oils by shaking the materials to be examined with sulphuric acid and treating with alumina. The amounts of diphenyl detected by this method in citrus fruits from various sources ranged from 0·8 (in grapefruit) to 7·7 (in lemon) mg. per 100 g. of fruit.

Dates.

(*See* 1840m, 1841h, 1842.)

Litchis.

1826. VERMA, U. P., AND PANDEY, S.
Dried litchi always has a good market.
Indian Fmg, 1957, **7**(6): 6-7, illus.

During sun drying of litchi fruits there was a loss of 25% due to rotting, and afterwards the fruits did not store well for more than a fortnight. Artificial dehydration was carried out at 130° to 140° F. for about 16 hours, and moisture contents were reduced to about 10%. The dehydrated fruits kept well. Drying cost about 1 rupee per 1,000 fruits.—Agric. Res. Inst., Sabour.

Macadamias.

1827. HAMILTON, R. A.
A study of germination and storage life of macadamia seed.
Proc. Amer. Soc. hort. Sci., 1957, **70**: 209-12, bibl. 3.

Mature, sound seed from 4 varieties of macadamia was divided into 2 grades, namely, No. 1 grade, nuts which were tight in the shell and sank in water, and No. 2 grade, nuts which were loose in the shell and generally floated in water. These were stored at room temperature ranging from 65 to 80° F. for varying periods.

No important differences in germination were found in No. 1 seeds stored for 1, 2, 3 or 4 months (average germination 32·8%), but seed stored for longer periods showed progressively less germination and failed to germinate after 12 months' storage. Germination of No. 2 seed was significantly less than that of No. 1 seed, and even freshly harvested No. 2 seed was considered unsatisfactory for seedling production. There were wide differences in germination and storage life between the varieties tested. No. 1 grade seed of Keauhou, the best variety, produced 200% more seedlings than that of Kakea, and showed over 30% germination after 9 months in storage. [See also *H.A.*, 27: 2816.]—Univ. Hawaii, Honolulu.

Olives.

(*See also* 1307, 1840b, g, z, 1841c, 2023, 2030.)

1828. Scaramuzzi, F.
Ricerche sul potere germinativo dei semi di diversa età in *Olea europaea* L. (**Studies on the germinating power of olive seeds of various ages.**) [French summary 1 p.]
Reprinted from *Agric. ital.*, 1957, **56**, as *Publ. Ist. Coltiv. arb. Univ. Firenze*, 1957, pp. 43, bibl. 27.

Studies were carried out on seeds of olive varieties Frantoio and Moraiolo from 1–5 years after harvesting. At the beginning of this period germination of perfect Frantoio seed was 24%; it fell gradually until the seeds were 3 years old and thereafter sharply. In Moraiolo the initial value was nearly 30%, after which it rose gradually until the seeds were 3 years old and then fell very sharply. Germination was much more rapid in young seeds than in old. The speed was greatest in Frantoio at 1 year and in Moraiolo at 2 years of age.

1829. de la Rocha G., G.
Ensayo de diversos tratamientos en la semilla de olivo, 1956. (**Trials with different treatments of olive seeds, 1956.**)
Inf. mens. Estac. exp. agric. La Molina, 1957, **31**(361): 15-17.

Repetition of the previous year's experiment [see *H.A.*, 27: 1855], using 1,000 olive stones per treatment, gave the following germination percentages: 39 from soaking in 0·5% potassium hydroxide, 37 from soaking in 0·5% sodium hydroxide, 36 from cracking the shells, 35 from soaking in sodium carbonate (50 g. per l.), 33 from soaking in 2% sulphuric acid and only 10 from removing the shells. The sodium carbonate treatment gave the most rapid germination.

1830. Morettini, A.
La biologia della fecondazione nelle cultivar di olivo e sua importanza pratica. (**The biology of fertilization in olive varieties and its practical significance.**)
Ital. agric., 1957, **94**: 1103-17, bibl. 30, illus.

The highly frost-resistant olive variety Leccino has the disadvantage of self sterility, but fruit set was satisfactory when pollen from Morchiaio was applied artificially.

1831. Russo, G., and Santoro, R.
Esperimenti di lotta antidacica eseguiti in Ascea Marina (Salerno) nel 1955. (**Experiments on olive-fly control in Ascea Marina (Salerno) during 1955.**) [English summary 1¼ p.]
Ann. Fac. Sci. agrar. Univ. Napoli, 1956/57, **22**: 113-62.

Good results were given by an autumn application of 0·03% parathion emulsion with the addition of 0·1% copper sulphate and a wetting agent. For low-volume spraying the parathion content was increased tenfold. Diazinon was less effective than parathion and was not activated by adding copper sulphate. A summer application of DDT+parathion merely delayed, but did not control, the autumn infestation. Dipterex (0,0-dimethyl-1-oxy-2, 2,2-trichloroethylphosphonate) emulsion at 0·05–0·075% was ineffective. [See also *H.A.*, 27: 3884.]

1832. Catalano, M.
Ricerche sull'impiego della trielina nella lavorazione delle sanse. (**Investigations on the use of trichloroethylene in processing olive pulp.**) [English summary 4 lines.]
Olearia, 1957, **11**: 257-61, bibl. 13, illus.

Trichloroethylene vapour can reduce the original moisture of olive pulp to 10–12%. Where it is used for oil extraction there are more impurities in the oil from hot than from cold processing.

Passion fruit.

1833. Cox, J. E.
Flowering and pollination of passion fruit.
Agric. Gaz. N.S.W., 1957, **68**: 573-6, illus.

A 2-year study was made of the floral movements and pollination of the purple passion fruit, *Passiflora edulis*. The flowers started to open during the night or early morning and by about noon the styles had bent back and were below the level of the anthers. About noon of the following day the flowers closed and after a few hours appeared as they had before opening. If fertilized the developing fruit grew out through the reclosed petals and sepals. The stigma was most receptive from the opening of the flower until early afternoon of the same day. Anthesis occurred before 1 p.m. in 10% of the flowers and before 4 p.m. in 50%. Thus self-pollination only occurred occasionally when high morning temperatures encouraged early anthesis. So long as it did not get wet the pollen remained fully viable for 24 hours, but if conditions were too hot and dry successful fertilizations were not obtained. Fruit set and development were equally good whether one, two or three stigmas were pollinated.—Gosford Citrus Exp. Stat. J.R.L.

1834. Gilmartin, A. J.
Post-fertilization seed and ovary development in *Passiflora edulis* Sims.
Trop. Agriculture Trin., 1958, **35**: 41-58, bibl. 36, illus.

This is a detailed botanical study of self-incompatibility and the 'hollow' fruit condition in the yellow-fruited passion fruit (*P.e.* f. *flavicarpa*), which is of economic importance in Hawaii. Where self-incompatibility occurred the pollen grains on selfed flowers either remained intact or germinated with pollen tube growth terminating near the stigma papillae. There appears to be some type of genetical basis for this condition.—Hawaii agric. Exp. Stat.

1835. OTAGAKI, K. K., AND MATSUMOTO, H.

Nutritive values and utility of passion fruit by-products.

J. agric. Food Chem., 1958, **6**: 54-7, bibl. 18, illus.

Passion fruit rinds and seeds, by-products of the juice industry, were found to be satisfactory for supplementing or replacing carbonaceous feedstuffs for dairy cows. The seed oil can also be used to supply the fat requirements of animals.—Hawaii agric. Exp. Stat.

Persimmons.

1836. SHIGETA, T., AND YASUNOBU, Y.

Basic studies on persimmon fruits. No. 1. (i) The effect of the state of fruiting branches on persimmon fruits. (ii) Fruit thinning in relation to yield and fruit size. [Japanese, with English summary ¼ p.]

Bull. Kanagawa agric. Exp. Stat. hort. Branch, 1957, No. 5, pp. 33-8, bibl. 8.

Fruit size was found to be affected by the angle of the fruiting branches, development being greatest in vertical shoots. Early thinning produced large fruits, but final yields were the same as those following later thinning. Labour requirements for early thinning were lower than for later thinning.

1837. VEN, S.-T., AND OTHERS.

A study of leaf spot *(Cercospora kaki)* attacking the Japanese persimmon. [Chinese, with English summary.]

Acta phytopathol. Sinica, 1956, **2**(1): 67-80, from *Ref. Ž.* (*Biol.*), 1957, No. 13, Abstr. 56,025.

Cercospora kaki, which attacks both *Diospyros lotus* and *D. kaki*, is not spread by wind, but mainly by water during rains. For control, spraying twice with bordeaux or the removal of infected calyxes after harvest is recommended.

1838. RAKITIN, JU. V., KRYLOV, A. V., AND TARAKANOVA, G. A.

Transformation of methyl alcohol, applied to stimulate ripening, in fruits. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1957, **116**: 874-7, bibl. 24.

Methyl alcohol in 25 and 50% aqueous solutions, injected into fully grown but green persimmon fruits at 0·5 ml./100 g., markedly accelerated ripening. When the transformation of labelled methyl alcohol was studied, it was found that about ⅓ was lost during ripening by decomposition into CO_2 and other volatiles or by transpiration, leaving ⅔ unchanged in the fruit, of which, however, only a small fraction (3·6% of the total) was firmly bound.

1839. OKAZAKI, M., AND YASUI, K.

Studies on gas-storage of kaki fruits *(Diospyros kaki* Linn. f.). [Japanese, with English summary 1 p.]

Sci. Reps Fac. Agric. Okayama, 1954, No. 4, pp. 23-31, bibl. 15, illus.

Trials with two 70-kg. lots of Japanese persimmons from different orchards packed in storage cans, 54·5×59·0 cm., the covers of which were sealed by paper, indicated that CO_2 produced in a container by such fruits should reach at least 42% but should not exceed 70-80%. The only deleterious effect of such storage [at least 42% CO_2] was the appearance in some specimens of a circular brown spot, about 3 cm.×1 cm., at the stylar end 2-4 weeks after the beginning of storage. The percentage of such fruits could be kept as low as 8% by delayed storage. The market price of such fruits was only a little lower than that of normal fruits. The two lots showed great differences in storage quality and indicated the desirability of phosphate manuring. [See *H.A.*, 27: 1861 and 28: 817 for more recent papers in this series.]

Tung.

See 1841d.

Sundry crops.

See 1840j.

1840.

Noted.

a ANON.

Phosphorus and orange quality.

Rur. Res. C.S.I.R.O., 1957, No. 21, pp. 22-4, bibl. 3, illus.

A popular account of results reported in *H.A.*, 26: 4044.

b BALDINI, E.

Contributo allo studio delle cultivar toscane di olivo. Indagini condotte in provincia di Pistoia. Parte II. **(Contributions to the study of Tuscan olive varieties. Investigations carried out in the province of Pistoia. Part II.** [English summary 6 lines.]

Ann. Sper. agrar., 1957, **11**(5), Suppl. pp. XLIX-LXXVI, bibl. 43, illus.

Descriptions of a further 20 varieties [see also *H.A.*, 28: 822e].

c BOTHAM, J. R.

A pictorial guide to propagating citrus trees.

J. Dep. Agric. S. Aust., 1957, **61**: 245-50, illus.

Clearly illustrated account of budding citrus.

d CADIZ, C. A.

The influence of five kinds of stocks on Szinkom mandarin *(Citrus reticulata* Blanco).

Philipp. Agric., 1957, **41**: 288-94, bibl. 5.

Rough lemon and calamandarin (*C. reticulata*×*C. mitis*) best to date; the trees have not yet fruited.

e COMELLI, A.

La tristeza des citrus en A.E.F. **(Tristeza disease of citrus in French Equatorial Africa.)**

Fruits d'Outre Mer, 1957, **12**: 415-19, bibl. 7, illus.

Rootstock problems and dangers of spread to North Africa.

f CONSTAS, A., VAMVACAS, N. J., AND STEFANIDES, C.
A contribution to the study of by-products of the citrus industry. [Greek, with French summary 5 lines.]
Pap. Panhellenic chem. Conf., Salonika, 1956, pp. 9, bibl. 9.
Including analyses of seed oils and essential oils of Greek oranges and citrons.

g ÉLANT, H.
L'oléiculture marocaine. **(Olive growing in Morocco.)**
Terre maroc., 1957, **31**: 363-9, bibl. 1, illus.
Production and pruning for regeneration.

h FLETCHER, W. A.
Citrus varieties and rootstocks for New Zealand.
N.Z. J. Agric., 1957, **95**: 393-400, illus.
Varieties of proved performance and some introductions, with notes on virus diseases.

i FLETCHER, W. A.
Trends in citrus fruit production and plantings.
N.Z. J. Agric., 1957, **95**: 609-13.
In New Zealand.

j FLETCHER, W. A.
Trends in sub-tropical fruit production and plantings in New Zealand.
N.Z. J. Agric., 1957, **95**: 584, illus.
Tree tomatoes, Chinese gooseberries, passion fruit and feijoas.

k (GARCÍA CABEZÓN, A.)
Jardín de aclimatación de la Orotava—Puerto de la Cruz—Tenerife. **(The Orotava garden for acclimatization of plants—Puerto de la Cruz—Tenerife.)**
Rep. Inst. nac. Invest. agron. Madrid 1955-1956, 1957, p. 199.
Avocado and banana varieties.

l GIACOMETTI, D. C.
Doenças de vírus e cavalos para citrus. **(Virus diseases and rootstocks for citrus.)** [English summary ½ p.]
Rev. Ceres, 1957, **10**: 127-36, bibl. 34, illus.
Mainly a review, with notes on a new disease of Rangpur lime known as wrinkling.

m HIBON, J.
Comment établir la "plan de fumure" d'une orangeraie? **(How to establish a manurial programme for an orange plantation.)**
Fruits et Prim., 1957, **27**: 229, 261-2.
Recommended quantities and dates of application for North Africa.

n KUPPUSWAMY, B. S., AND ANANTHANARAYANAN, K. K.
Seville lemon—a promising variety for South India.
South Indian Hort., 1957, **5**: 29-31, illus.
Notes on propagation and cultivation.

o LARUE, P.
Israël et le IV^{e} Congrès de l'Agrumiculture Méditerranéenne. **(Israel and the IVth congress on citrus growing in the Mediterranean.)**
Tunis. agric., 1957, **58**: 89-106.
A detailed survey of citrus growing in Israel.

p LIME, B. J., AND OTHERS.
Spectrophotometric methods for determining pigmentation—beta-carotene and lycopene—in Ruby Red grapefruit.
J. agric. Food Chem., 1957, **5**: 941-4, bibl. 6.

q MANCHESTER, A. C.
Orange tree to breakfast table. Marketing costs and margins for Florida oranges.
Mktng Res. Rep. U.S. Dep. Agric. **164**, 1957, pp. 12.

r MARTELLI, G. P.
La batteriosi o piticchia batterica degli agrumi. **(Bacteriosis or bacterial pitting of citrus.)**
Inf. fitopat., 1957, **7**: 283-5, illus.
Recommendations on controlling *Pseudomonas syringae*.

s MILLER, E. V.
The physiology of citrus fruits in storage. II.
Bot. Rev., 1958, **24**: 43-59, bibl. 47.
A review. [For part I see *H.A.*, 16: 2250.]

t MILLER, R. L.
Zineb—improved summer control of citrus fruit russet.
Citrus Ind., 1957, **38**(11): 7-9, 27-8.
Observations based on growers' experiences are given.

u MONTENEGRO, H. W. S., AND SALIBE, A. A.
A exocortis e a situação atual dos porta-enxertos para citrus. **(Exocortis and the present situation with regard to citrus rootstocks.)**
Rev. Agric. Piracicaba, 1957, **32**: 271-8, bibl. 6, illus.
Tabulated data on susceptibility of varieties and rootstocks.

v MYSORE DEPARTMENT OF AGRICULTURE.
The horticultural resources of Coorg district and the role of citrus research stations (Chethalli and Athur).
Mysore agric. Cal. 1956-57, 1957, pp. 8-13.
Cultural notes on mandarins; experiments in progress outlined.

w NIXON, R. W.
Differences among varieties of the date palm in tolerance of *Graphiola* leaf spot.
Plant Dis. Reptr, 1957, **41**: 1026-8, bibl. 5.
At Weslaco, Texas, where *G. phoenicis* is troublesome.

x NOUR-ELDIN, F., AND CHILDS, J. F. L.
Sweet orange bark pitting, an unreliable symptom of tristeza infection.
Plant Dis. Reptr, 1957, **41**: 1011-13, bibl. 13, illus.

y OSTE, C. A., AND TOLL JUBES, J.
Conducción del vivero cítrico. Segunda parte. **(Citrus nursery management. Part 2.)**
Circ. Estac. exp. agríc. Tucumán **149**, 1955, pp. 15, illus., [received 1958].
Advice on nursery practices; for part 1 see *H.A.*, 26: 984.

z PÁDUA, M. D. L.
Contributo allo studio comparativo degli oli di patauà e d'oliva. **(Contribution to the comparative study of patauà and olive oils.)** [English summary 4 lines.]
Olearia, 1957, **11**: 262-4, bibl. 18.
Composition and properties of olive oil and oil from the palm *Oenocarpus bataua*.

1841.

a PHILIPPE, J.
Note sur la biologie florale de l'avocatier et choix des variétés à cultiver sur la base du groupe floral. **[A note on the floral biology of the avocado tree and the choice of varieties to plant on the basis of the floral group.)** [Flemish summary, 1 p.]
Bull. agric. Congo belge, 1957, **48**: 1155-62, bibl. 7.
A- and B-flowering varieties with planting recommendations for the Congo.

b RANGASWAMI, G., AND RAJAGOPALAN, C. K. S.
Studies on citrus canker in Madras State.
South Indian Hort., 1957, **5**: 50-7, bibl. 15.
Pathenogenicity of *Xanthomonas citri* to several citrus species.

c RUSSO, G.
Stato attuale della lotta contro la mosca delle olive (*Dacus oleae* Gml.). **(Present state of control of the olive fly *(Dacus oleae)*.)** [English summary 1½ pp.]
Ann. Fac. Sci. agrar. Univ. Napoli, 1956/57, **22**: 69-95, bibl. 16.
A review, with recommendations based mainly on the use of parathion.

d SADOKOVA, A. P.
Proteins of tung fruits.
Doklady vsesojuz. Akad. seljsk. Nauk, 1957, **22**(12): 22-6, bibl. 6.

e SELLE, R. M.
Spot chromatography identification of citrus rootstocks.
Nature, 1958, **181**: 506-7, bibl. 4, illus.
A slightly more detailed account of the method described in *H.A.*, 28: 763.

f SINGH, L. B.
Optimum time for budding citrus in Uttar Pradesh.
A.R. Fruit Res. Stat., Saharanpur, 1950-53, 1957, pp. 34-6, bibl. 1.
June better than the usual Sept.–Oct. and March–April periods.

g SINGH, R. N.
Some promising sweet oranges *(C. sinensis)* and mandarins *(C. reticulata)* for Uttar Pradesh.
A.R. Fruit Res. Stat., Saharanpur, 1950-53, 1957, pp. 47-55.
Descriptions of the fruits of 9 oranges and 2 mandarins.

h SPOON, W.
Toepassing van dadelstroop en dadelpitten. **(The use of date syrup and date stones.)** [English summary 1 p.]
Reprinted from *Cacao, Choc. Suikerw.*, 1957, **25**: 340, as *Ber. Afd. trop. Prod. kon. Inst. Tropen* **261**, pp. 10, bibl. 5.
Including data on chemical composition.

i STOLZY, L. H., AND CAHOON, G. A.
A field-calibrated portable neutron rate meter for measuring soil moisture in citrus orchards.
Proc. Soil Sci. Soc. Amer., 1957, **21**: 571-5, bibl. 18, illus.

j SURGULADZE, Š. M.
An interesting case of species formation. (Preliminary communication.) [Russian.]
Agrobiologija, 1957, No. 4, p. 154.
Two shoots of *Citrus ichangensis* developed on a *C. junos* tree.

k TEAKLE, D. S.
Avocado root rot.
Qd agric. J., 1957, **83**: 701-4, illus.
Symptoms caused by, and suggestions for controlling, *Phytophthora cinnamomi.*

l WEATHERS, L. G.
Newly-found citrus disease.
Calif. Citrogr., 1958, **43**: 138-40, illus.
For another account of vein-yellowing see *H.A.*, 28: 783.

m ZACHOS, D. G.
***Septoria* spots of citrus in Greece.**
FAO Plant Prot. Bull., 1957, **6**: 41-2, bibl. 8, illus.
S. depressa, new to Greece; zinc-copper-lime spray recommended for control.

TROPICAL FRUIT AND PLANTATION CROPS.

General.

(*See also* 1787, 1998 l, q, 2006, 2007, 2019-2022, 2026, 2029, 2037, 2039, 2045, 2047-2049, 2054, 2055, 2058j, q.)

1842. SARKAR, S. K.
Male sterility in palms. [Portuguese summary ¾ p.]
Agron. lusit., 1956, **18**: 257-71, bibl. 4, illus.

Deformed and empty pollen grains, failure of pollen to germinate on stigmas or on artificial media, deformed and empty pollen mother cells and meiotic irregularities were studied in 20 species belonging to 23 genera of palms. In areca and coconut palms meiotic abnormalities occurred and in date palms the pollen mother cells were often deformed.

1843. SCHARPENSEEL, H. W., AND VICARIO, B. T.
Pectin content and quality of different tropical plant materials.
Araneta J. Agric., 1956 (issued 1957), **3**(4): 51-7, bibl. 24.
SHARPENSEEL, H. W.
Über Pektingehalt und -qualität tropischer Pflanzenmaterialien. **(The pectin content and quality of tropical plant materials.)** [English and French summaries about 10 lines each.]
Landw. Forsch., 1957, **10**: 191-4, bibl. 24.

The pectin contents, and their jellying properties and methoxyl contents, found in various parts of 25 common tropical plants are tabulated. The wild fig (*Ficus nota*), batoan (*Dracontomelum edule*), jack fruit, papaw, banana, sweet potato, guava, breadfruit and eggplant contain substantial amounts of pectin of good quality.
J.R.L.

1844. PETERSON, G. D., JR.
Studies on control of the giant African snail on Guam.
Hilgardia, 1957, **26**: 643-58, bibl. 17, illus.

Effective control of *Achatina fulica* has been obtained with sodium arsenite sprays, but these are not considered safe for use in farming and residential areas. Metaldehyde sprays and a poison bait of bran, metaldehyde and calcium arsenate proved very effective and relatively safe to use. Three barriers were used to prevent snails invading crop areas, viz. a strip of wire window screen (1 ft. high), a belt of cleared land, and a shallow trench sprayed with black oil. A carnivorous snail, *Gonaxis kibweziensis*, has been introduced for biological control and has shown promise; the Indian glowworm, *Lamprophorus tenebrosus*, has also been introduced. Rats, coconut crabs and ducks gave some degree of snail control.

Bananas.

(*See also* 1316i, 1350, 1840k, 1997e, q.)

1845. BIDNER-BARHAVA, N., AND RAVIKOVITCH, S.
The influence of various soils on the mineral composition of banana leaves.
From abstr. in *Bull. Res. Coun. Israel, Sect. B*, 1957, **6**: 264-5.

Bananas grown on calcareous soils in the Jordan Valley deteriorate rapidly and have to be discarded after 2 or 3 crops. Leaves from plants growing in calcareous soils had higher Ca, Mg and ash contents and a lower K content than had leaves from plants growing in soils low in Ca.—Agric. Res. Stat., Rehovot.

1846. CHAKRAVARTY, T.
Anthracnose of banana *(Gloeosporium musarum* Cke. & Massee) with special reference to latent infection in storage.
Trans. Brit. mycol. Soc., 1957, **40**: 337-45, bibl. 14, illus.

When green bananas were artificially inoculated, the fungus penetrated the cuticle but remained inactive in the subcuticular region until the fruit ripened. The inhibitory factor in the unripe fruit may be a tannin.—Univ. Manchester.

1847. CUILLÉ, J., AND GUYOT, H.
Les traitements pesticides à débit réduit en culture fruitière tropicale. Le matériel de traitement, son utilisation. **(Low volume pesticide spraying in tropical fruit growing. Spraying equipment and its use.)**
Fruits d'Outre Mer, 1957, **12**: 461-75, bibl. 14, illus.

This article, the first of a series under the general heading of the first part of the title, brings up to date the authors' work on the use of low volume spraying equipment, mainly for the control of *Cercospora musae* on bananas. The studies include the use of rotary atomizers and of aerial spraying. [See also *H.A.*, 25: 995, 996, 3254; 26: 4134; and 27: 1872 and 2993n.]

1848. (MAGEE, C. J.)
Dr. Magee outlines fight against leaf spot.
Banana Bull., 1957, **20**(12): 14-16.

White oil at 0·5% and malachite green, 1 in 10,000, should be added to water-based sprays applied 3 or 4 times from December to March. Misting and fogging methods using mixtures of orchard or lubricating oil, dieselene, white oil and copper oxychloride also show promise in Australia.

1849. DESROSIERS, R., AND AMPUERO, E.
Investigación en el control de la sigatoka. **(Investigation on the control of banana leaf spot disease.)**
Agric. trop. Bogotá, 1957, **13**: 509-14.

In general, low-volume spraying gave better results against *Cercospora musae* than did older methods. Agricultural oil at 28 l. per ha., with or without the addition of fungicides, gave good control. Zineb and copper oxychloride were each more effective in a 60% emulsion of the oil in water than in water alone or in a 20% or 40% emulsion. The use of portable, semi-portable, tractor-drawn and helicopter-operated equipment is briefly discussed.

1850. Castaño A., J. J.
Sigatoka del banano. Observaciones y comentarios sobre su control en la zona del departamento del Magdalena. **(Leaf spot disease of bananas. Observations and comments on its control in the department of Magdalena.)**
Agric. trop. Bogotá, 1957, **13**: 537-42, bibl. 4, illus.

Copper fungicides give good control, but produce brown patches on the fruit. Dithiocarbamates are satisfactory in dry areas, but lack persistence in wet. Recommendations for times and methods of spraying are given and types of equipment are discussed. Treatment by helicopter proved uneconomic and not very efficient.

1851. Rishbeth, J., and Naylor, A. G.
***Fusarium* wilt of bananas in Jamaica. III. Attempted control.**
Ann. Bot. Lond., 1957, **21**: 599-609, bibl. 18.

Experiments were set up in an attempt to control wilt in Gros Michel. Passive measures of eradication and quarantine seldom achieved more than temporary results. Soil disinfection by fumigants was unpromising. Flood-fallowing, important in Central America, was not practicable in the West Indies. Application to the soil of lime, phosphate and potash, separately or in combination, had little or no effect on wilt incidence; application of nitrogen often resulted in an earlier appearance of wilt. Supplements of various organic materials such as green manures, compost and bagasse also proved ineffective. Possible reasons for these failures are discussed, and various suggestions are made for the prevention or limitation of wilt in resistant varieties. [Authors' abstract. For part II see *H.A.*, 27: 3900.]

1852. Anon.
El combate contra el gorgojo negro del plátano. **(Control of the black borer of bananas.)**
Not. agríc. Serv. Shell Agric. Venezuela, 1957, No. 20, pp. 3-4, illus.

Good control of *Cosmopolites sordidus* was obtained in Venezuela by soaking suckers for 24 hours in a 0·5% solution of 23%-active aldrin. Infestation of full-grown plants was controlled by spraying their bases, and the soil within 1 m. radius of each, with a 1% solution of the same product.

1853. Whalley, P. E. S.
The banana weevil and its control.
E. Afr. agric. J., 1957, **23**: 110-12, bibl. 10, illus.

In addition to *Cosmopolites sordidus*, *Temnoschoita nigroplagiata* has been recorded as attacking living bananas in Uganda. The distribution of *Temnoschoita* spp. is described, and the characters which differentiate the larvae from *Cosmopolites* are listed. In trials at Kampala effective control of banana weevils was achieved by a single application of dieldrin 0·5% dust to the stools and to pieces of cut pseudostem.—Dep. Agric., Uganda.

1854. Leach, R.
Blackhead toppling disease of bananas.
Nature, 1958, **181**: 204-5, bibl. 3.

Moderate infection of Lacatan roots and corms by *Radopholus similis* and secondary organisms is apt to cause toppling of plants carrying heavy bunches, whereas more severe infection appears to reduce plant and bunch size to an extent at which losses from toppling are reduced. The Gros Michel banana, unlike the Lacatan, is little affected by the disease.—Banana Bd Res. Dep., Kingston, Jamaica.

Cacao.

(*See also* 1997i, 1998d, 1999q, 2058o.)

1855. Cope, F. W.
Incompatibility in *Theobroma cacao*.
Nature, 1958, **181**: 279, bibl. 1.

In cacao the incompatibility mechanism has non-fusion of gametes as its fundamental manifestation. Three main types of self-incompatible tree can be recognized in which the proportions of non-fusion ovules are 25, 50 and approximately 100%, respectively. The hypothesis that incompatibility depends on the operation of an allelic series at a single locus [*H.A.*, 23: 4581] appears to be inadequate. Instead, the existence of two independent loci is postulated, one concerned with the production of an "incompatibility precursor" acting before meiosis, and the other which imparts specificity to the precursor acting after meiosis. If either one or both of these loci is inactive the tree is fully self-compatible, which means, in effect, that there are 3 main types of self-compatible tree.—I.C.T.A., Trinidad.

1856. Thorold, C. A.
A chlorosis disease of cocoa in the Southern Cameroons.
J. W. Afr. sci. Ass., 1957, **3**(1): 96-106, illus., from *Biol. Abstr., Sect. D*, 1957, **31**, No. 39,664.

A chlorosis affecting the leaves of cocoa trees in this area is described. It has not been possible to transmit the disease to healthy plants by grafting nor by mealybugs. When solutions of metallic sulphate were injected into affected trees, it appeared that copper sulphate was associated with a disappearance of chlorotic symptoms, but repetitions failed to confirm this association. Symptom expression may be transitory or persistent, but it has not been possible to correlate it with particular edaphic or climatic conditions. There is no evidence that this chlorosis is directly associated with death of trees nor with declining yields.

1857. Orellana, R. G., and Som, R. K.
Correlation between low temperature and incidence of *Phytophthora* pod rot of cacao in Ceylon.
FAO Plant Prot. Bull., 1957, 6: 6-8, bibl. 3.

In a statistical study of the correlations between weather factors and the incidence of black pod in one area in Ceylon a highly significant negative correlation was found to exist between the incidence of the disease and the minimum temperatures recorded one month previously. No correlations existed between other climatic factors, including rainfall, and the disease incidence in the same or subsequent months. More detailed studies on these lines should provide data of practical value for timing fungicide applications.—FAO and WHO.

1858. CHANT, S. R.
A die-back of cacao seedlings in Nigeria caused by a species of *Phytophthora*.
Nature, 1957, **180**: 1494-5, bibl. 3.

Since 1954 a *Phytophthora* sp., thought to be a form *P. parasitica*, has caused considerable losses among cacao seedlings in Nigerian nurseries. The symptoms of the disease are described. About 95% control resulted from the application of a proprietary copper fungicide at 3- or 6-day intervals, but at intervals of 9 or 12 days only slight control was obtained.—Fed. Dep. agric. Res., Nigeria.

1859. (FORSYTH, W. G. C., AND QUESNEL, V. C.)
The preparation of cacao for the market.
Cacao, 1957, **3**(12): 2-3.

This article summarizes the answers to a questionnaire on fermentation methods issued by the Inter-American Technical Cacao Committee. Four methods are in current use: (1) curing on the drying platform in parts of Ecuador, and in this method fermentation occurs only when the cacao is heaped at night. (2) In heaps on the ground, common in West Africa and capable of producing a good standard product. (3) In baskets for 6–7 days, a useful method for small batches. (4) In types of fermentation box; here the duration of fermentation is very variable depending largely on variety, e.g. 2–3 days reaching 40–45° C. for Criollo and 6–8 days reaching 46–52° C. with Forastero.

1860. PLATONE, E., AND OTHERS.
Estudios sobre la fermentación de los cacaos venezolanos. (**Studies on the fermentation of Venezuelan cacaos.**)
Atti. Ist. bot. Univ. Pavia, 1955, **13**: 95-218, bibls, illus., [received 1957].

A series of 13 papers in Spanish and 1 in Italian, on various aspects of cacao bean fermentation. The type of fermentation practised in the Aragua province of Venezuela requires 114 hours. It is interrupted at the 12th–14th hour by a 6-hour period of insolation, the beans being raked over the drying ground to remove mucilage. This lengthy and costly procedure does not give a product significantly superior to that from the Barlovento system of 70 hours' continuous fermentation practised in the rest of the country. Substantial advantages were gained in the latter (a) by adding a small quantity of yeast (0·3% of the weight of the beans) and (b) by ensuring homogeneity of the mass by movement. In this connection a newly designed wooden revolving drum gave much better results than the usual tank. Good indications of the completion of fermentation were constant minima in both catalase index and reducing-sugar percentage. The permanganate index was unreliable in this respect. Fermentation was alcoholic only in the earlier phases. It increased titratable acids and decreased the mineral content of the mass. Contrary to the findings of some authors, there was evidence of a slight increase, rather than a decrease, in tannins. A high-quality product was obtained from relatively poor raw material by exposing the beans to sunlight immediately on removal from the pod, soaking them overnight in water and giving a second insolation before fermenting in tanks the following day. The proportion of cacao types in the mixed plantations of Venezuela can be calculated by recording the percentages of beans fully fermented at the end of 2, 3, 4 and 6 days, since Criollo requires 2, Amelonado 3, Cundeamor 4, Angoleta 6 and Calabacillo more than 6 days to ferment completely. The external features of pods are unreliable indications of type. The viability of cacao beans was not affected by temperatures up to 40° C., but was checked moderately by 5 or more hours' exposure to 45° C. and seriously by short exposures to 50° C. or higher. During fermentation, however, the first factor to reach a level sufficient to check germination is the ethyl alcohol formed and the second the acetic acid. Finally, the temperature of fermentation renders the seed completely non-viable.

1861. NEIRINCKX, G., AND STRUELENS, H.
La cacao du Congo belge. Étude chimique des fèves. Action de la fermentation sur les constituants. (**Cocoa of the Belgian Congo. A chemical study of the beans. Effect of fermentation on their constituents.**)
[Flemish summary 2¼ p.]
Bull. agric. Congo belge, 1957, **48**: 1445-61, illus.

By withdrawing daily samples for a week the gradual development of the effects of fermentation on moisture content, nitrogenous compounds, fats, tannins and acidity has been determined. Special attention was paid to so-called lignified beans.

1862. GRIFFITHS, L. A.
Detection of the substrate of enzymic browning in cacao by a post-chromatographic enzymatic technique.
Nature, 1957, **180**: 1373-4, bibl. 3.

In both Forestero and Criollo cacao beans the major substrate of polyphenol oxidase proved to be (—)-epicatechin. It is clear that the content of this catechin at the end of fermentation is a major factor in the enzymic browning that occurs subsequently during drying, and that the leucocyanidins play only a very small part in this process.—Reg. Res. Centre, I.C.T.A., Trinidad.

1863. MACLEAN, J. A. R.
Cacao bean pigments and their behaviour during fermentation.
Chem. Ind. Lond., 1957, No. 49, pp. 1597-8, bibl. 5.

The beans of West African Amelonado cacao and of Upper Amazon hybrids contained the five main acid-soluble components found in Forestero beans in Trinidad [*H.A.*, 23: 1257, 1258]. During fermentation for 6 and 8 days the two anthocyanins present disappeared. One of two leucocyanidins present and epicatechin decreased steadily during fermentation, the former disappearing between the 6th and the 8th day and the latter declining to 18–26% of the original content by the 8th day. The second leucocyanidin increased during the first 3 days of fermentation and then decreased until by the 6th day the amount remaining, except in the upper Amazon types, was below that previously reported for purple beans.—W.A.C.R.I.

Coconuts.

(*See also* 1998c, u, v, 1999b, s.)

1864. Aiyadurai, S. G.
Observations on germination of dry seed coconuts.
Madras agric. J., 1956, **43**: 464-6, from abstr. in *Biol. Abstr.*, *Sect. D*, 1957, **31**, No. 36,005.

Nuts in which the milk had dried up were soaked for 1 week and their germination compared with that of normal seed nuts. The latter showed 93% germination compared with 64% for dry nuts which increased in weight during soaking and with 31% for dry nuts which did not increase in weight.

1865. Velasco, J. R.
Copper deficiency in Bicol soil as a possible cause of the cadang-cadang of coconut.
Velasco, J. R., Palmquist, E. M., and Mamawal, E. B.
Copper content of some soil samples from coconut groves of Laguna and Quezon provinces.
Philipp. Agric., 1957, **41**: 157-70, bibl. 9, illus., and 241-3, bibl. 2.

The symptoms of cadang-cadang are described and the theory that a virus is responsible is discussed and found wanting in certain respects. Observations suggest that the disease is associated with certain soil types, notably a light, grey-black soil characteristic of parts of the Bicol region. Other plants are apt to show symptoms of nutrient disturbance on this soil. There is evidence that its Cu content may be very low, and in a small pot experiment tomato plants grown in it responded favourably to an application of $CuSO_4$ and unfavourably to one of $ZnSO_4$. The evidence that cadang-cadang may be associated with Cu deficiency is described by the author as meagre, but an experiment is in progress to determine the effects of Cu on coconut trees suffering of the disease.

The second paper is a note on the Cu content of certain soils in relation to cadang-cadang disease. [See also *H.A.*, 27: 864.]

1866. O'Connor, B. A.
Notes on the control of *Oryctes rhinoceros* L. by the use of insecticides.
Agric. J. Dep. Agric. Fiji, 1957, **28**: 15-18, bibl. 2.

In trials with various insecticides mixed with damp sawdust and placed in the crowns of the trees diazinon 32% w.p. produced a better knockdown and a better residual effect than the standard BHC 50% w.p. Previous tests have indicated that mixtures of BHC 50% w.p. and sawdust do not repel beetles but that mixtures containing BHC miscible concentrate may be repellent. Methods developed for applying insecticides in the leaf axils are described.

1867. Gonzalez, J., Jr., Bunyi, A. B., and Ramos, V. T.
Residual effect of commercial insecticides on the copra beetles.
Araneta J. Agric., 1957, **4**(1): 84-98, bibl. 6, illus.

In laboratory tests BHC, aldrin, methoxychlor, DDT and dieldrin were effective against the copra beetle, *Necrobia rufipes*, BHC, dieldrin and aldrin showing the longest residual toxicity. It is recommended that these insecticides should be applied to the walls of warehouses, not to the copra itself, as a supplementary control measure. J.R.L.

Coffee.

(*See also* 1065, 1997g, v, w, 1998n, t, z, 1999a, t.)

1868. Indian Coffee Board.
Ninth Annual Report of the Research Department of the Coffee Board, 1955-1956, Balehonnur, 1957, pp. 115, being *Bull.* **9**, price Re 1.

Agronomy: Manurial, cultivation, pruning and shade tree trials are in progress. In a topping experiment robusta topped at 4 ft. made better growth and outyielded plants topped at 3 ft. In germination studies with arabica, removal of the parchment and, to a lesser extent, splitting the parchment hastened germination but did not affect final germination rate. *Botany:* Coffee breeding for leaf disease resistance and yield, with clonal progeny trials; top working arabica on robusta; trials of multiple and single stem pruning; cytological studies, including successful use of colchicine to produce robusta polyploids. *Chemistry:* Numerous fertilizer experiments are in progress. Certain results with arabica indicate the superiority of N+P (60 : 40 lb./acre N and P_2O_5) over other treatments. The N+P combination has also caused superior growth of seedlings in the nursery. *Entomology:* Studies on the coffee stem borer and green bug on arabica and shot-hole borer on robusta. Continued applications of BHC formulations reduced stem borer infestation. Folidol and Ekatox proved effective against green bug [see *H.A.*, 28: 959v]. A mixture of BHC and DDT shows promise against shot-hole borer. *Mycology:* The principal diseases being studied are rust, black rot, brown eye-spot and seedling diseases. Bordeaux mixture, 0·5% against *Hemileia*, has shown up well compared with proprietary fungicides. Damping-off in the nursery was best controlled by bordeaux and by Cheshunt mixture.

1869. Pang, O. A.
De aanleg van kleine koffietoetsproeven op ondernemingen. (**The layout of small test plots of coffee on estates.**) [Indonesian and English summaries ¼ p. each.]
Bergcultures, 1957, **26**: 535-41.

The importance of finding the most suitable planting material for conditions on individual estates is emphasized. The layout of estate trials, from 0·5 to 1 ha. in size, is described. Clones recommended for testing include BP 39, 42, 210, 234, 288, 358 and 409 and SA 237.

1870. Evans, H. R.
Recent work on the propagation of coffee from cuttings in Kenya.
Trop. Agriculture Trin., 1958, **35**: 65-76, bibl. 1, illus.

Growth-promoting substances are capable of accelerating the rooting of *Coffea arabica* cuttings by increasing the percentage of cuttings rooting during the third and fourth months following insertion. Of the substances used, Hortomone A at a 5% concentration as a powder treatment, α-naphthalene-acetic acid at 0·75 g. and β-indolyl-acetic acid at 0·25 g. in 100 c.c. of liquid, made up as half-and-half tap water and ethyl alcohol, and used as 2-second dips, were the most promising treatments. The best type of cutting was the green, semi-ripe, 2 or 3 noded, nodal type taken from terminal sucker growths and prepared by making a wedge-shaped cut through the node. Though the most favourable rootings resulted when cuttings were taken at 8 a.m., good results were also achieved from cuttings taken between 8 a.m. and 1 p.m. Vermiculite and river silt, at a 1 : 1 mixture, and river silt by itself proved to be the best rooting media. For practical purposes a 1 : 1 mixture of red soil and river sand can be expected to produce almost as good rooting results. Cuttings rooted best during the rainy seasons. [Author's summary.]—Dep. Agric., Kenya.

1871. MACHADO S., A.
Capacidad de cambio de cationes de las raíces, como principio básico en la explotación de cafetos y otras plantas asociadas. **(Cation-exchange capacity of roots as a basic principle in growing coffee in association with other plants.)**
Cenicafé, 1957, **8**: 277-85, bibl. 8.

Average annual yields of coffee over 5 years were 965 kg. per ha. under *Inga* shade, 812 kg. under banana and only 422 under *Calliandria* shade. Leaf analyses showed that *Calliandria* competed much more seriously than *Inga* with the coffee for Mg and particularly for N, giving indirect evidence that, of the two shade trees, *Inga* had the lower cation-exchange capacity in the roots. Direct determination of this gave low results of doubtful accuracy, but a more satisfactory technique is being sought.

1872. THOMAS, K. M.
The manuring of coffee in South India—a review.
Indian Coffee, 1957, **21**: 309-20, bibl. 29.

The author reviews the results of Indian research on the fertilizer needs of coffee, which began as early as 1877, and of similar experiments conducted outside India. Early workers showed the need for nitrogen and potash. Permanent manurial trials started in 1937 at Balehonnur averaged, for the first 9 years, 54·8% increase in favour of N+P+K, but these and other experiments showed no unanimity regarding the most suitable proportions in which to apply N, P and K. In E. Africa mulching has caused large yield increases and this may be because mulches have added considerable quantities of NPK to the soil. New experiments have recently been laid down in India; pending their results the author recommends 80 lb. N, 60 lb. P_2O_5 and 80 lb. K_2O per acre per annum applied in two equal dressings.

1873. LAINS E SILVA, H(ÉLIA), AND LAINS E SILVA, H(ÉLDER).
Variação de composição mineral de folhas de cafeeiro. **(Variation in mineral composition of coffee leaves.)** [English summary 2¼ pp.]
Rev. Café portug., 1956, **3**(11): 45-61, bibl. 1; **3**(12): 15-34; 1957, **4**(14): 24-60, bibl. 73, also issued as *Separata Rev. Café portug.* **7**, 1957, pp. 81, bibl. 73.

Information is given on the collection and preparation of samples and analytical methods for N, P, K, Ca and Mg as carried out at the International Basic Economic Corporation (IBEC) Research Institute, Brazil. Detailed statistical analyses are reported of variations in the chemical composition of coffee leaves on the same tree, on trees of the same variety and on trees of different varieties. On the basis of these studies the following recommendations are made for sampling. Leaves should be taken from both the north and south sides of the tree, between 0·75 and 1·5 m. above ground level, keeping separate those from branches with and without fruit. Leaves of the 3rd node from the tips of lateral branches are most suitable. Among varieties of coffee Bourbon is the most reliable as a guide to nutrient status. The best time for gathering is between 2 and 4 p.m., and drying should follow immediately. These recommendations apply when all 5 elements are to be determined. North and south sampling is necessary only for N analysis. Non-fruiting branches are selected for determining N, P or K and fruiting branches for Ca or Mg. The 2nd pair of leaves may be substituted for the 3rd in P, K, Ca or Mg analyses. Coffee of the variety Nacional should be avoided in Mg tests. Except for Ca analyses, gathering between 8.30 and 10.30 a.m. is as good as between 2 and 4 p.m., and 18 hours' refrigeration is permissible before testing.

1874. NEPTUNE MÉNARD, L., AND MALAVOLTA, E.
Absorção e distribuição do fósforo radioativo no cafeeiro (*Coffea arabica* L. var. *caturra*, KMC). **(Absorption and distribution of radioactive phosphorus in the coffee plant *(Coffea arabica* var. *caturra.)*)** [English summary ¾ p.]
Bol. Super. Serv. Café, S. Paulo, 1957, **32**(366): 7-14, bibl. 8, illus.

Young coffee plants growing in nutrient solution were treated when 5 months' old with P^{32} at 0·7 microcuries per l. After 24 hours 14·7% of the active material had been absorbed. The percentage rose to 30·8 in 48 hours, 38·2 in 72 hours and 68·74 in 6 weeks. Accumulation was particularly high in secondary roots and old parts of stems. Young leaves accumulated more than older ones and the veins and petioles were richer than the interveinal regions in P^{32}.

1875. MES, M. G.
Studies on the flowering of *Coffea arabica* L. I. The influence of temperature on the initiation and growth of coffee flower buds. II. Breaking the dormancy of coffee flower buds.
Portugal. Acta biol., 1956-1957, **4**: 328-41, bibl. 19; 342-54, bibl. 5, illus.

he number of flower buds per leaf axil was greater in offee bushes grown at 23°/17° C. than at 26°/20° C. r 30°/24° C., but the initiation rate and growth of the uds were greater at the higher temperatures. At all emperatures, including 20°/14° C., most of the mature ower buds became dormant for up to 2 months. t the higher temperatures they opened in a prolonged rregular sequence, many drying up or forming 'star' owers. At 23°/17° C. flowering proceeded in flushes. ransference to 30°/24° C. a few months before flowering was much less detrimental to the bushes than continuous rowth at this high temperature range. Neither urgical treatments such as bark ringing nor applicaon to leaves or buds of agar containing growth substances, ethylene chlorhydrin, thiourea or sugar, timulated initiation or broke the dormancy of buds. triking results in dormancy breaking, however, were btained by submerging whole tops of plants in winter or an hour. Good results also followed when water was dripped on internodes or supplied to cut stem tips. esponse occurred 8–11 days after treatment, according o air temperature, but immature buds were unaffected. —Earhart Plant Res. Lab., Calif.

876. Dublin, P.
Biologie florale du *Coffea dewevrei* De Wild race *excelsa* A. Chevalier. 1re partie: Microsporogénèse et étude du gamétophyte male. **(Floral biology of *C. dewevrei* var. *excelsa*. Part 1. Microsporogenesis and a study of the male gametophyte.)** [English and Spanish summaries ½ p. each.]
Agron. trop., 1957, **12**: 576-94, bibl. 52, illus.

ollowing a historical review of the species, the author escribes in detail meiosis and the development of ollen grains. Details of the structure and viability the pollen are given.—Stat. Rech. Boukoko, ubangui.

877. Wellman, F. L.
Blister spot of arabica coffee from virus in Costa Rica. [Spanish summary 13 lines.]
Turrialba, 1957, **7**: 13-15, bibl. 5, illus., and reprinted in *J. agric. Soc. Trin. Tob.*, 1957, **57**: 303-10, bibl. 5, illus.

he symptoms are described of a virus disease of coffee Costa Rica, which is transmitted by the aphis *oxoptera aurantiae*. It is apparently not seed borne, nd leaf-rubbing techniques have failed to transmit to arabica, canephora and liberica coffee or to a umber of vegetable-crop hosts.

878. Viegas, A. P.
Cultivo de cafeeiros em ágar nutritivo. **(Growing coffee plants on nutrient agar.)**
Rev. Café portug., 1957, **4**(15): 5-9.

offee seedlings for research on fungus diseases were rown in Pyrex glass tubes 12 inches long and 1 inch diameter, containing 50 c.c. of sterilized agar repared with Hoagland's solution. Calcium hypohlorite was used to disinfect the coffee cherries and the eeds extracted from them.

1879. Fassi, B.
Les maladies foliaires du caféier robusta en Ubangi. **(Leaf diseases of robusta coffee in Ubangi.)**
Bull. Inf. I.N.E.A.C., 1957, **6**: 381-9, bibl. 5, illus.

Anthracnose caused by *Colletotrichum coffeanum* is described in full. Cuprous oxide and copper oxychloride sprays (0·4% and 0·5% respectively) are recommended for control. Two types of chlorosis are also described, caused by Mg and N deficiencies respectively. The author recommends increasing the organic content of the soil and planting hedges of *Moghania* sp. between the rows of coffee.

1880. Nutman, F. J.
Coffee berry disease.
Anon.
Coffee berry disease.
Mon. Bull. Coffee Bd Kenya, 1957, **22**: 273, and 1958, **23**: 8.

Sprays containing phenyl mercury acetate, applied before flowering and again after flowering, and thereafter repeated at intervals of not more than 6 weeks, offer the best hope of control at present possible. Sprays should be applied at the rate of about 1 oz. of mercury in about 200 gal. water to the acre. The early sprays, at around flowering, seem generally to have been the most effective ones. Mercurial sprays are not likely to control outbreaks which have already reached serious proportions.

The second paper, however, reports phytocidal damage showing up 5 months after spraying.

1881. Rosado Dias, M. A. F.
Aspectos fisiológicos da imunidade. Susceptibilidade do cafeeiro à *Hemileia vastatrix*. **(Physiological aspects of immunity. Susceptibility of coffee plants to *Hemileia vastatrix*.)** [English and French summaries 1 p. each.]
Rev. Café portug., 1957, **4**(15): 52-67, bibl. 11.

The view that resistance of coffee plants to rust (*Hemileia vastatrix*) is correlated with high transpiration rates of certain varieties [see *H.A.*, 4: 637] was not supported by data from a series of experiments on 4 varieties.

1882. Schmitz, G., and Crisinel, P.
La lutte contre *Stephanoderes hampei* Ferr. **(Control of *Stephanoderes hampei*.)**
Publ. Sér. sci. I.N.E.A.C. **70**, 1957, pp. 156, bibl. 171, illus., 130 Fr. Belg.

In this monograph on the coffee berry borer extensive work is reviewed on its life history, natural enemies, the damage caused and methods of control. Recent experiments in Uele have shown that, where *Dichocrocis crocodora* is also present, the most satisfactory treatment is 600 g. endrin or 800 g. parathion in 1,200–1,250 l. per ha. applied from mid-April to mid-May. When *Dichocrosis* is not present 800 g. BHC per ha. is preferable, applied in June. The effects and economics of various insecticides and various methods of application are compared.

1883. Willet, J. R.
Verwerking van een enquête betreffende ziekten en plagen in de koffiecultuur, 1955 en 1956. (**A survey of pests and diseases of coffee, 1955 and 1956.**) [English and Indonesian summaries 17 and 20 lines.]
Bergcultures, 1957, **26**: 335-8.

A survey, similar to that conducted in 1954 [see *H.A.*, 26: 1151], has shown that coffee berry borer (*Stephanoderes hampei*) has now become the most important pest in Indonesia. Ant control by chlorinated hydrocarbons has been successfully carried out on a large scale.

1884. Puzzi, D., Orlando, A., and Ribas, W. C.
O emprêgo dos frascos caça-moscas no combate às moscas das frutas. (**The use of bottle fly traps for control of fruit flies.**)
Biológico, 1957, **23**: 189-96, bibl. 5, illus.

A bottle trap with funnel-shaped entries in the base and sides was more than 6 times as efficient as an ordinary wide-mouthed bottle with a top entry in collecting Mediterranean fruit flies in coffee plantations. The bait was a 7% solution of crude sugar. Captures were slightly higher on the west and south than on the east and north sides of the trees. In peach orchards, although captures of *Anastrepha* and *Ceratitis* were high, particularly where 8 bottle traps per tree were used, the number of infested fruits was very little reduced.

1885. McCrae, D. J.
Advance in the control of coffee leafminers.
Mon. Bull. Coffee Bd Kenya, 1957, **22**: 341.

Good control has been obtained of *Leucoptera coffeella* and *L. caffeina* with malathion, which kills the moth only, at 2 pints of 50% E.C. per acre and with diazinon, which kills the moth and the larva, at 1½ pints of 60% E.C. per acre. Two sprays are needed; the second, which should be diazinon, 8–10 days after the first.

1886. Calcagnolo, G., and Leiderman, L.
As pulverizações concentradas no combate ao bicho mineiro do café. (**Concentrated sprays for control of the coffee leaf miner.**)
Biológico, 1957, **23**: 203-19, bibl. 13.

The emulsions compared were 0·4% dieldrin, 2% toxaphene, 0·25% BHC and 0·125% parathion. The wettable powders (in the same order) were used at 0·16%, 0·8%, 0·1% and 0·05%. Where application was at 3-weekly intervals, all treatments except dieldrin wettable powder gave control above 75%, dieldrin emulsion giving the best results (86·8%). With the other products emulsions showed only slight superiority over wettable forms. With 5-weekly treatments the only good result was 80·8% control with dieldrin emulsion, the wettable powder being useless and the other products giving control ranging from 39% to 69% in efficiency.

1887. Franco do Amaral, S.
Efeito de diferentes concentrações de BHC sôbre o bicho mineiro *Perileucoptera coffeella* (Guérin-Méneville). (**Effect of different concentrations of BHC on the coffee leaf miner, *Perileucoptera coffeella*.**) [English summary ½ p.]
Arq. Inst. biol. S. Paulo, 1956, **23**: 21-33, bibl. 8, illus.

Highly satisfactory control of adult coffee leaf miners was given by dusting the bushes with BHC containing 0·5% of the gamma isomer. Higher concentrations gave lower mortality owing possibly to an increase in the repellent effect of the spray.

1888. Tapley, R. G.
A possible case of coffee thrips resistant to DDT.
E. Afr. agric. J., 1957, **23**: 82-3, bibl. 6.

An investigation suggests that a strain of coffee thrips (*Diarthrothrips coffeae*) in northern Tanganyika has built up a resistance to DDT, and there is an indication that another factor, "vigour tolerance" to insecticides in general, may be involved.

1889. Robinson, J., and Mesmer, E. T.
The persistence of insecticides deposits applied to the bark of coffee trees (*Coffea arabica*). I. DDT deposits.
E. Afr. agric. J., 1957, **23**: 130-4, bibl. 1.

Experiments in Tanganyika showed that DDT emulsions sprayed on the trunks of coffee trees gave deposits in which the total DDT content at first decreased rapidly but then more slowly. Assuming that the DDT remains biologically available, it would appear that the trees can be protected from white coffee borer (*Anthores leuconotus*) for several months.

1890. Vasudevan, C. K.
How to control the coffee stem borer.
Indian Fmg, 1957, 7(8): 16-17, illus.

Swabbing the surfaces of stems and thick branches with BHC or dieldrin twice or thrice annually at flight periods reduced the incidence of stem borers [*Xylotrechus quadripes*].—Coffee Res. Stat., Balehonnur.

1891. Pereira Junior, J.
Método rapido de liberação da mucilagem do café despolpado pela ativação de suas proprias enzimas. I. Esterases pancreaticas e ativadores cationicos na desgomagem do café despolpado. (**Rapid method for freeing depulped coffee from mucilage by activating its own enzymes. I. Pancreatic esterases and cationic activators in the treatment of depulped coffee.**) [English summary ½ p.]
Arq. Inst. biol. S. Paulo, 1956, **23**: 79-86, bibl. 14.

With 0·4% sodium chloride as activator in an alkaline medium (pH 10) containing 1% calcium hydroxide, the mucilage was almost completely removed from depulped coffee in 1 hour [see also *H.A.*, 27: 2994o]. No heating was necessary. The addition of a crude extract of rat saliva did not improve the result and rat pancreas extract improved it only slightly.

1892. Nascimento, U., and Gonçalves, E. F.
Estudos relativos à pavimentação de terreiros para secagem de café em Angola. (**Studies relating to paving materials for drying coffee on the ground in Angola.**)
Rev. Café portug., 1957, 4(14): 5-16.

Neither compacted soil, asphalt, concrete nor stone flooring fulfilled all the requirements for drying coffee, viz. simplicity of construction, low cost, good heating and hygroscopic properties and absence of unpleasant effects on flavour. Good quality flooring tiles, known to give good results, were not obtainable locally, but promising results were obtained by adjusting the texture of the soil to correct any excess or deficiency of plastic clay and mixing with it 10% of cement. A high organic-matter content of the soil was a disadvantage.

Mangoes.

(*See also* 1998w, 1999i, 2004.)

1893. Nambiar, K. P. P.
A note on nursery investigation on mango rootstocks.
South Indian Hort., 1957, **5**: 33-4.

The percentage germination and the extent of polyembryony in seeds of Chandrakaran, Bappakai, Olour, Kurukkan and Puliyan mangoes was investigated. Seeds of the polyembryonic varieties Chandrakaran and Bappakai showed a high rate of germination, producing vigorous seedlings large enough to graft one year after sowing.—Agric. Res. Stat., Taliparamba.

J.R.L.

1894. Singh, L. B., and Singh, U. R.
Mango (*Mangifera indica*) 8-week-old graft versus commonly inarched one.
A.R. Fruit Res. Stat., Saharanpur, 1950-53, 1957, pp. 56-8, bibl. 1, illus.

Seedlings were successfully inarched when only 2–3 weeks old, unions being formed and the grafted plants detached by the time the stocks were 8 weeks old. The growth made by these plants over 4 years was better than that of plants produced by orthodox inarching methods.

1895. Singh, L. B., and Singh, R. L.
Mango budding in situ in Uttar Pradesh.
A.R. Fruit Res. Stat., Saharanpur, 1950-53, 1957, pp. 44-6, bibl. 1.

For top-working 8-year-old mangoes June was a better month than April and patch budding a better method than shield or forkert.

1896. Lysander, M., and Pillai, K.
On off-season mango production.
South Indian Hort., 1957, **5**: 20-4.

During the last 15 years on the fruit farm at Kanyakumari mangoes have only twice failed to produce an out-of-season crop, whereas the normal crop has failed completely or been negligible in 6 years. The total income from out-of-season crops has exceeded that from normal crops. This unusual phenomenon is attributed to the fairly well distributed rainfall. Out-of-season cropping records for the six months October to March are tabulated for 12 varieties.

J.R.L.

1897. Maheswariah, B. M.
Mango-hoppers and their control.
Mysore agric. Cal. 1956-57, 1957, pp. 125-6, bibl. 4.

These jassid bugs (*Idiocerus* spp.) were controlled up to 90% by 0·62% Geigy mango spray (DDT+sulphur), which was effective for 4–5 weeks and also checked mildew on the flowers. These results from Bangalore are compared with those from other parts of India, in which various insecticides were tested.

Oil palms.

(*See also* 1997o, u, 1999w.)

1898. W.A.I.F.O.R.
Fifth Annual Report of the West African Institute for Oil Palm Research, 1956-57, 1957, pp. 132, 2s. 6d.

Part II, Research, pp. 37-117, includes details of a large number of experiments and studies, among which are: *Agronomy:* Fertilizers, mulches and irrigation in nurseries; transplanting; land preparation and the care of young plantations; seedling selection; spacing; manuring; time of harvesting; pruning; replanting; and cover crops to maintain soil fertility. *Chemistry:* Studies on oil determination and colour and on various aspects of soil analysis and fertility. *Plant Breeding:* New progeny trials; inheritance studies; selection of seed trees for extension work seed production; seed trials; studies on Deli palms; and analysis of fruit and bunch composition. *Plant nutrition:* Development of the Plant Nutrition Unit; fertilizer trials, including one concerned particularly with Mg; studies on little-leaf disease, on which B has so far had no effect; and a sand culture experiment, from which deficiency symptoms have been determined for N, P, K, Mg, Ca and S. *Plant pathology:* Studies on blast disease, with which *Rhizoctonia lamellifera* and a *Pythium* sp. (probably *P. splendens*) appear to be associated as primary organisms; and studies on fungicides to control *Cercospora* leaf spot and anthracnose. *Plant physiology:* Investigations on the storage and germination of seeds, photosynthesis and stomatal movements. *Statistics:* Uniformity and calibration trials.

1899. Bachy, A., and Fehling, C.
La fusariose du palmier à huile en Côte d'Ivoire. (**Vascular wilt of oil palm in the Ivory Coast.**)
J. Agric. trop. Bot. appl., 1957, **4**: 228-40, bibl. 17, illus.

The conditions favouring the occurrence of vascular wilt (*Fusarium oxysporum* f. *elaeidis*) in palms in the Ivory Coast have been studied. Infection has been found on both adult and replanted palms. Wilt spread was twice as fast on plots low in K than on plots with high K levels. It also occurred where Mn was deficient. Wilt infection appeared to be more frequent in low-lying areas.

1900. Cachan, P.
L'hispidae mineur *Coelaenomenodera elaeidis* Maul. parasite du palmier à huile dans la zone guinéenne. (**The hispid leaf-miner, *Coelaenomenodera elaeidis*, a pest of oil palms in the Guinea area.**) [English and Spanish summaries ⅓ p. each.]
Agron. trop., 1957, **12**: 610-32, bibl. 12, illus.

The author examines the climatic conditions which have led to recent serious infestations. Damage is mainly caused by the larvae, but only the adults are controlled by BHC dusts and dieldrin sprays. More meteorological stations are needed to provide data from which to forecast outbreaks.

Papaws.

1901. Teakle, D. S.
Papaw root rot caused by *Phytophthora palmivora* Butl.
Qd J. agric. Sci., 1957, **14**: 81-91, bibl. 15, illus.

The relative pathogenicity of *Phytophthora palmivora* and *Pythium vexans* was investigated. The former causes a severe root rot, predisposing factors being waterlogging, high soil temperatures and root damage. *P. palmivora* can also cause fruit rot if artificially inoculated. Crop rotation and drainage are likely to afford some control.

Pineapples.

(*See also* 1350, 1351, 1997p, q.)

1902. Hseu, C. C.
The line selection and comparison of pineapples in the Cayenne group. (Chinese, with English summary 2 pp.]
J. agric. Ass. China, 1957, No. 18, pp. 47-58, bibl. 10, illus.

Six selected lines of Cayenne pineapples were grown in a randomized block experiment for 5 years. Yield, shape and other fruit characters, and the number of leaves, suckers and slips produced were recorded. It is concluded that under Taiwan conditions the best lines are No. 2, Shen-jiang and Sarawak in that order.—Taiwan Provincial Coll. Agric. J.R.L.

1903. Cannon, R. C.
Closer spacing of pineapples.
Qd agric. J., 1957, **83**: 575-8, illus.

In Queensland the standard spacing of pineapples is 12 in. apart in double rows 2 ft. apart, with 6 ft. from centre to centre between the paired rows. In a trial at Maroochy Experiment Station this spacing was varied to give spacings in the rows of 12, 11, 10 and 9 in. Yields of the plant crop increased progressively with closer spacing from 22·3 tons per acre at 12 in. to 29·0 tons at 9 in. Fruit size and suckering were similar at all spacings.

1904. Yoshihara, M., and Hwang, Y.-J.
A study in the relationship between planting distance and yield of pineapple. [Chinese, with English summary 1¼ pp.]
J. agric. Ass. China, 1957, No. 18, pp. 59-66.

As a result of experiments carried out during 1930–40 it is recommended that pineapples be spaced 30–35 cm. apart in double rows 60 cm. apart, with 100 cm. between the beds. Plants 30 cm. apart in the rows yielded better than plants 35, 40 or 45 cm. apart. Slightly better yields were obtained when the rows were 60 cm. rather than 50 or 45 cm. apart. The yield was reduced if there was more than 100 cm. between the beds. In the fields where the plants were spaced closely there was no weeding problem and the ratoons did not get broken down.—Pineapple Seedling Multiplic. Stat., Pingtung Hsien. J.R.L.

1905. Cannon, R. C.
Pineapple fertilizer investigations in south-eastern Queensland.
Qd J. agric. Sci., 1957, **14**: 93-110, bibl. 7.

Fertilizer trials were carried out during 1951–1954 on four soil types differing mainly in their K content. Four applications per annum were made into the base leaves of the plants. There were only limited responses to N and only one trial produced significant increases in yield of the plant crop from progressive increments. In this case the yield increased from 23·8 tons per acre with 100 lb. of N of 25·2 tons with 300 lb. It is concluded, based on growth measurements, that the requirements of the crop up to the time of flowering do not exceed 100 lb. of N per year, but that the rate may be increased with advantage during the post-flowering period. The higher rates of N applied after harvesting of the plant crop promoted suckering, which resulted in progressive yield increases up to 5·9 tons per acre in the ratoon crop. There were no responses to P in either plant growth or yield of the plant crop in any of the trials. There was, however, an unexplained yield response in the ratoon crop in one of the trials. The response to K was most marked, and the results indicate that pineapples grown on soils below 0·2 m.e. of replaceable K per 100 g. require K at the rate of at least 166 lb. per acre per year. There was virtually no response to added K on soils with a replaceable potassium content of 0·5 m.e. and over per 100 g. Fruit quality determinations showed that K tends to increase both sugars and acids, whereas N has the reverse effect. [Author's summary. See also *H.A.*, 28: 900.]

1906. Hernández-Medina, E., Cruz-Miret, A., and Lugo-López, M. A.
Residual effect of filter-press-cake applications on pineapple yields. [Spanish summary ½ p.]
J. Agric. Univ. P.R., 1957, **41**: 197-201, bibl. 4.

Various amounts of filter-press cake were applied before Red Spanish pineapple slips were planted. The plant crop was harvested after 18 months and the ratoons were then given various amounts of NPK fertilizers. Results obtained on the ratoon crop harvested 12 months later showed that plots that had received 24 to 32 tons filter-press cake per acre plus 1,500 lb. 12–6–10 fertilizer yielded as much as, or in some cases significantly more than, plots which had received 3,000 lb. of fertilizer but no filter-press cake.

1907. Su, N.-R.
An experiment on the nitrogen requirement of pineapples. [English, with Chinese summary 2 pp.]
J. agric. Ass. China, 1957, No. 18, pp. 18-46, bibl. 5.

A field experiment on the San-Ling type of Smooth Cayenne pineapple was carried out using sulphate of ammonia at rates of 0, 4, 8, 12, 16, 20 or 24 g. N per plant applied on 5 dates between planting in September 1953 and harvesting in the summer of 1955. Uniform dressings of P and K fertilizers were applied on all treatments. Growth measurements showed that all rates of N produced significantly better plants than no N but that too heavy an application was detrimental. There were no significant differences in yield between the plots receiving the various N treatments, but 12 g. N per plant gave the most economical yield of fruit and the leaves remained green, allowing the suckers to develop. The fruit from plants receiving the higher N dressings was more compact in texture, was significantly heavier (though not economically so), and had a higher specific gravity and lower acidity than the fruit from the plants receiving only 4 or 8 g. N. The heavier dressings of N delayed ripening but never by more than 7 days. Leaf analysis showed considerable seasonal variation in the total N and nitrate N contents. Differences of leaf N due to treatment were not very marked when the plants were young or the weather dry, but with older plants, especially if the soil was warm and moist, the effects of treatment were more marked. The greater the improvement in growth due to improved N nutrition the lower were the K and P contents of the leaves.—Tou-Liu Pineapple Exp. Stat., Taiwan Pineapple Corp. J.R.L.

1908. Heinicke, R. M., and Gortner, W. A.
Stem bromelain—a new protease preparation from pineapple plants.
Econ. Bot., 1957, **11**: 225-34, bibl. 11, illus.

A proteolytic enzyme may be prepared from mature pineapple stems, after the fruit has been harvested, by acetone precipitation and centrifugation. The acetone is recovered by distilling the supernatant solution. Bromelain is a complex of a number of enzymes active at different pH levels. Its enzyme content and activity are compared with those of papain and ficin, to which it is generally superior. Its production fits in well with the other activities of pineapple growing and it is already being produced on a pilot scale. It will find commercial use in bating hides, tenderizing meat, chill-proofing beer, etc., and, being a by-product of a major industry, should be produced at a relatively low and stable cost.—Pineapple Res. Inst. Hawaii, Honolulu.

Rubber trees.

(*See also* 1352, 1997h, j, m, 1998h, i, x, y, 1999e, m-o, u.)

1909. Blackman, G. E. (Chairman) and others.
Report of the Advisory Committee enquiring into Production, Development and Consumption Research in the Natural Rubber Industry, submitted to the Chairman, Rubber Producers' Council of the Federation of Malaya, Kuala Lumpur, 1957, pp. 49, $2 Malaya.

The reporting committee, basing its recommendations on a tour of examination made by its members in person, covers a very wide field. Briefly, it embraces the research organization and staff establishment of the whole rubber industry in Malaya. Item by item each problem is set out and considered and suggestions are made which may help towards a solution.

1910. Rubber Research Institute, Ceylon.
Annual Report of the Rubber Research Institute of Ceylon, 1956, 1957, pp. 125.

Work reported includes: *Botany:* breeding and selection, clone performance, large-scale crown-budding experiments, hedge-planting systems. *Plant Pathology:* study and control of *Phytophthora palmivora* and *Fomes lignosus. Agronomy:* manurial trials, weed control, green manure studies. *Chemistry:* contamination of latex by the use of copper-containing fungicidal dusts, various studies on latex and smoked and air-dried sheet.

1911. I.R.C.I.
Institut des Recherches sur le Caoutchouc en Indochine. Rapport Annuel, 1956. **(Annual Report of the Institute for Research on Rubber in Indo-China for 1956)**, 1957, pp. 165.

The report describes current experimental work on: selection and breeding and the performance of selected clones, stock-scion relationships, tapping procedures, spacing, the diagnosis of fertilizer needs, early selection of high yielding trees, methods of stimulating latex formation, and fungal diseases.

1912. Collier, J.
L'hévéaculture chez les autochtones du Nord-Sankuru. **(Rubber cultivation among the indigenous people of North Sankuru.)** [Flemish summary 3 pp.]
Bull. agric. Congo belge, 1957, **48**: 1465-99, bibl. 8, illus.

This is a detailed account of a successful large-scale project, in which an undeveloped area in the Belgian Congo has been systematically planted to rubber since 1941. The author describes the terrain and the establishment of blocks of hevea. Difficulties were encountered due to *Fomes lignosus* and *Oidium heveae*. The tapping system and rubber production are fully described. The project has also led to the social development of the indigenous people.

1913. Liefstingh, G.
Heveaplantmateriaal in de praktijk. **(Hevea planting material in the field.)** [Indonesian and English summaries ¼ p. each.]
Bergcultures, 1957, **26**: 487-97, bibl. 9, illus.

The yields of the clones LCB 1320, PR 107 and Tjir 1 and of seedlings in commercial plantations are discussed. Yields of seedlings of Tjir 1 × Tjir 16, Tjir 1, AV 163 and LCB 1320 were similar to, but less variable than, those of the 3 clones. Yields from budded trees of WR 101, GT 1 and clones recommended for small-scale planting were, in general, higher than those of LCB 1320, PR 107 and Tjir 1, but these high yields were obtained with optimal care. The average yield per hectare of seedlings may be increased by close planting, followed by selective thinning.

1914. Liefstingh, G., and Pek, T. T.
Lokale natoetsing van hevea plantmateriaal. **(Local field trials with hevea planting material.)** [Indonesian and English summaries ¼ p. each.]
Bergcultures, 1957, **26**: 497-504, bibl. 5.

Preliminary reports are given from field trials on 20 estates with clones recommended for both large- and small-scale planting. The early growth of the "small-scale" clones PR 228 and AV 385 has been equal to, or better than, that of LCB 1320.

1915. TONG, T. H.
Een beschouwing over een wijze van uitplanten van moderne hevea-clonen met de bijbedoeling om later in deze aanplantingen ook hoogwaardig clonaal zaad te kunnen winnen. **(A method for planting out new hevea clones, with the secondary purpose of collecting valuable clonal seed.)** [Indonesian and English summaries ¼ p. each.]
Bergcultures, 1957, **26**: 519-25.

A design is proposed for combined clone-testing and seed gardens, in which plots of modern high-yielding clones are planted together with plots of a control clone PR 107 or GT 1. In the border zones between the plots biclonal seed may be harvested.

1916. ANON.
Achieving an optimum stand.
Plant. Bull. R.R.I.M., 1958, No. 34, pp. 5-10, illus.

For rubber recommended spacings are: 30 ft. × 6 ft. for clonal seedlings, 30 ft. × 8 ft. for old established clones, and 29 ft. × 10 ft. or 36 ft. × 8 ft. for modern high yielding clones. Thinning should be gradual and finally provide about 90–100 tappable trees per acre with modern clones.

1917. OWEN, G., WESTGARTH, D. R., AND IYER, G. C.
Manuring hevea: effects of fertilizers on growth and yield of mature rubber trees.
J. Rubb. Res. Inst. Malaya, 1957, **15**: 29-52, bibl. 4.

Yield and growth responses are given for the past 6 years of 17 NPK fertilizer experiments, which had been planted in 1935–38 and rehabilitated in 1947–48. The average response to N alone has been small, but NPK applications have increased yields by an average of 5·6% and tree girth by 16·3%. Examples are given of both young and mature trees benefiting from NP applications. The effect of NK applications has been reflected chiefly in increased yields. In general, there has been more response to fertilizers on inland soils than on alluvial coastal soils. J.R.L.

1918. CONSTABLE, D. H.
A comparison of forms of nitrogen manuring.
Quart. Circ. Rubb. Res. Inst. Ceylon, 1957, **33**: 39-42.

At equivalent N rates sodium nitrate is as effective as sulphate of ammonia for immature rubber. Heavy N manuring (on an N-deficient soil) can partially overcome the ill effects of early under-manuring. Restorative manuring is unlikely to prove economic or satisfactory as compared with an original full NPK manuring programme. [From author's conclusions.]

1919. BOLLE-JONES, E. W.
A magnesium-manganese interrelationship in the mineral nutrition of *Hevea brasiliensis*.
J. Rubb. Res. Inst. Malaya, 1957, **15**: 22-8, bibl. 8, illus.

Hevea seedlings were grown in sand culture at low, normal or high levels of Mg and Mn. Increasing the supply of Mg to plants receiving a low or normal level of Mn induced Mn-deficiency symptoms and significantly reduced the concentrations of Mn in the laminae. The concentration of Mg found in the upper laminae decreased as the supply of Mn increased and sometimes Mg-deficiency symptoms developed. At a high level of Mg supply an increase in the concentration of Mg in the laminae was accompanied by an increase in the Mn concentration. It is suggested that in the early stages of the rubber seedling's development the supply of Mn is more important than that of Mg. J.R.L.

1920. BOLLE-JONES, E. W., AND MALLIKARJUNESWARA, V. R.
Effects of mineral status and light on rubber formation in hevea.
J. Rubb. Res. Inst. Malaya, 1957, **15**: 95-108, bibl. 20.

Sand cultures indicated that, during the first four months of growth, the rubber content of the green portion of the stem increased with additional phosphate supply. Later, any factor which retarded growth increased rubber concentration. Variations in nutrient status, however, were of less importance than light intensity as a factor in rubber formation. Rubber is looked upon as a by-product of growth; the amounts present in seedlings were proportional to the amounts of dry matter, carbohydrates and proteins present. [See also *H.A.*, 27: 2921.]

1921. BOLLE-JONES, E. W., AND HILTON, R. N.
Susceptibility of hevea seedlings to *Helminthosporium heveae* attack in relation to their nutrient status.
J. Rubb. Res. Inst. Malaya, 1957, **15**: 80-5, bibl. 6.

Rubber seedlings were grown, exposed to infection by *Helminthosporium heveae*, in pots at three levels of N and two of Ca. Data for dry weight, number of leaflets, height, girth, and number of *Helminthosporium* lesions per leaflet are given for plants of each treatment. In addition, the results of leaf analysis for N, P, Mg, K, Ca and rubber are presented. It is concluded that the higher levels of N supply increased the number of lesions but the higher level of Ca did not. Chemical analyses suggested that the increased susceptibility at higher N levels might be associated with the relative reduction in the P and K concentrations within the laminae. [Authors' abstract.]

1922. WIJBRANS, J. R., AND TONG, T. H.
Nieuwe wegen ter bestrijding van djamur upas. **(New methods of controlling pink disease.)** [Indonesian and English summaries 12 and 13 lines.]
Bergcultures, 1957, **26**: 465-8, bibl. 6, illus.

In untapped trees copper sprays have controlled *Corticium salmonicolor*, while in tapped trees tar derivatives have given good control. Pruning of dead and infected twigs, and wound treatment with a mixture of petroleum and fungicide may also be used for control.—Alg. Proefst. A.V.R.O.S., Medan.

1923. RISDON, E. J.
Some preliminary comments on the contamination of natural rubber by fungicidal dusts containing copper.
Quart. Circ. Rubb. Res. Inst. Ceylon, 1957, **33**: 35-8, and reported in *Planter, Kuala Lumpur*, 1958, **34**: 155-8.

Some degree of contamination is liable to occur when copper-containing dusts are employed during the "phytophthora" season on areas of rubber in tapping. Suggestions are made on ways of removing or inactivating the extra copper.

1924. WIJBRANS, J. R.
Ratten in rubber. **(Rats in rubber.)** [English and Indonesian summaries 22 and 31 lines.]
Bergcultures, 1957, **26**: 339-45, illus.

In an 8-month-old rubber plantation with a thick *Pueraria* cover crop, trunks were often severely damaged by rats. Control was obtained with coumarin-based rat poisons, and most of the trees recovered satisfactorily.

1925. TONG, T. H.
Resultaten van enige tapproeven op Polonia. **(Results of some tapping trials at Polonia.)** [Indonesian and English summaries ¼ p. each.]
Bergcultures, 1957, **26**: 559-71, bibl. 3.

Tapping systems and intensities were compared in a series of experiments involving 10 clones. During the first 3 years there was little difference in yields between mild tapping and 100% tapping, but after the fourth year differences between the systems became greater. A decrease in yield occurred at the change-over to a higher panel with both 100% and mild tapping. With a 67% tapping system continuous tapping appeared to be more favourable than periodic tapping, but periodic tapping with short tapping and resting periods was better than periodic tapping with longer tapping and resting periods. Growth also appeared to be less adversely affected by continuous tapping than by periodic tapping.—Alg. Proefst. A.V.R.O.S., Medan.

1926. DE JONGE, P.
Stimulation of bark renewal of hevea and its effect on yield of latex.
J. Rubb. Res. Inst. Malaya, 1957, **15**: 53-71, bibl. 3, illus.

The effects on bark renewal and latex yield of palm oil and a number of petroleum greases, applied with and without 2,4-D, were studied. Most treatments, particularly those including 1% 2,4-D, caused increases of yield and bark renewal in the first year and, to a lesser extent, in the second year. The increased thickness of renewed bark appeared, however, to be due solely to activation of the cork cambium, and no increase in laticiferous tissue was noted. Certain follow-up experiments now in progress are described.

1927. TAYSUM, D. H.
A simple apparatus for the collection of *Hevea* latex under aseptic conditions.
J. appl. Bact., 1957, **20**: 188-94, bibl. 3, illus.

A simple apparatus, designed to eliminate the bacterial infection of *Hevea* latex which occurs on tapping, is described. It produces two materials, ultraviolet irradiated latex and non-irradiated latex. An attempt has been made to maintain normal tapping conditions on a half-spiral cut. Under these conditions the latex flow time and the dry rubber content were both increased. [Author's summary.]—R.R.I.M.

Sugar cane.

(*See also* 1081w, 1353, 1354, 1997a-c, f, k, l, n, r-t, 1998f, g, j, k, m, r, s, 1999c, h, k, l, p, r.)

1928. SOUTH AFRICAN SUGAR JOURNAL.
The South African sugar year book 1956-57. South African Sugar Journal, 44 Stability Bldgs, Smith St., Durban, 1957, 10½ × 8½ in., pp. 269, illus., 10s. (post free).

This comprehensive reference book contains special articles on sugar growing, reviews and reports on the industry, a statistical section and notes on the sugar milling enterprises of South Africa and neighbouring countries.

1929. HAWAIIAN SUGAR PLANTERS' ASSOCIATION.
Report of the Experiment Station Committee for the year ending September 30, 1957, pp. 80, illus.

The report contains information on: *Cultural practices:* Use of aqua ammonia in irrigation water and by injection, volatilization loss in alkaline soil, effects of soil fumigants on rate of nitrification of ammonia, leaching losses of N and K (indicating importance of correct placement and timing), influence of N on quality and yield, the effectiveness of raw rock phosphate demonstrated, the effect of K deficiency on carbohydrate translocation and P utilization, studies using radioactive S, studies on juice quality, soil compaction and tillage studies, effects of gibberellic acid in elongating cane, sealing of concrete tanks. *Diseases:* Varietal resistance and use of fungicides against red rot, control of chlorotic streak, effect of fumigants on soil fungi, nematode studies. *Insects:* Possible effect of mealybug infestation on varietal decline and its control, rat control by poison baits using maize and thallous sulphate. *Irrigation:* Studies of moisture consumption by cane and of soil infiltration in relation to irrigation. *Mechanization:* Self-loading infield pick-up transport dealing with 30–75 gross tons/hour, a two-way cut-load machine and other equipment. *Organic Chemistry:* Evaluation of sugar cane wax, sucrose detergents, ammoniation of bagasse pith for cattle feed and hardboards. *Varieties:* Breeding and varietal tests, acreage census results, flowering in relation to nitrogen and moisture, flowering control by chemicals. *Weed control:* A new ARCADE concentrate developed, tests of new herbicides, soil fumigants such as methyl bromide in use as herbicides, effects of dalapon on sugar cane, several herbicide-tolerant strains of weeds, control of ditch weeds by fish.

1930. QUEENSLAND.
Fifty-seventh Annual Report of the Bureau of Sugar Experiment Stations, 1956/57, Brisbane, 1957, pp. 103, illus.

The many projects reported include fertilizer trials with urea and high levels of N and P; herbicides, including dalapon against *Phragmites* and sodium pentachlorphenate against giant sensitive weed; decomposition of phenoxyacetic-acid-type herbicides in the soil; cane deterioration studies, including the effect of maleic hydrazide; control of ratoon stunting, chlorotic streak and other diseases, including a list of grasses through which ratoon stunting disease may be transmitted, and experiments on the sterilization of cane knives; control of various insect pests; reports on many variety trials and on the behaviour of promising new hybrids in different areas.

1931. South African Sugar Association.
Annual Report of the Experiment Station of the South African Sugar Association, Mount Edgecombe, Natal, for 1956-1957,
1957, pp. 36, illus.

Plant nutrition: Responses to N were greater with ratoons than plant cane, but this was not due to residual N; previous green manuring or fallowing may restrict the response in plant cane. P caused significant increases in both plant cane and in ratoons when supplemented by top dressing, but the responses of ratoons to residual P alone were less than those of plant cane. Responses to K were commoner and larger with ratoons than with plant cane. P took part in most positive interactions between fertilizers applied to plant canes, but N/K interactions assumed greater proportions with ratoons. In other trials there were no significant differences between the responses to different forms of N, and the 3rd ratoon in a burning *vs.* trashing experiment again showed the benefit of trashing. A long term NPK experiment in its 2nd ratoon gave increased yields with 100 lb./acre N, but P top dressings in the absence of N and K depressed yields. In P experiments the residual effect of applications of superphosphate made at planting time was still considerable in 2nd ratoons; the effects of rock phosphate were even more lasting. In another experiment high levels of N applied to 2nd ratoons were uneconomic and K deficiency was observed, but after heavy applications of P and K, the 3rd ratoon responded to levels of N as high as 2,500 lb./acre ammonium sulphate and outyielded the plant cane crop. Analyses of molasses indicated K depletion in old cane lands and significant negative correlations between K and both Mg and Ca. In the 1956/7 season the sucrose content in the crop from July to November was closely correlated with sunshine from March to June and negatively correlated with rainfall during this period. *Fertilizer advisory service:* A study of the fertility levels of subsoils showed decreasing fertility with depth and justified the sampling of only the top 9 in. of soil in advisory work. Analyses of samples of sunn hemp, grown as a green manure crop, showed that the weekly increases of N, P and K per acre gained by this crop were equivalent to 33·0 lb. of ammonium sulphate, 14·2 lb. of superphosphate and 3·0 lb. of muriate of potash. *Cane varieties:* In variety trials seedlings N : Co. 376 and N : Co. 382 compared favourably with C.P. 34/79 and the older commercial varieties. In selection work the bunch-planting technique was tested and enabled inferior seedlings to be effectively eliminated. Attempts to induce apomixis artificially are in progress in order to rejuvenate deteriorated varieties. Experiments in floral initiation are also reported. *Cane diseases:* Investigations continued with ratoon-stunting disease and chlorotic streak. *Entomology:* Experimental inoculation of cane cuttings with extracts from crushed mealybugs indicated that part of the stunting effect is due to the presence of toxins produced by micro-organisms associated with the insects. Investigations continued on dead-heart caused by the borer *Sesamia calamistis.* Studies of eelworm infestation have been planned as a result of striking improvements in the growth of cane following soil sterilization with D-D.

1932. Barbados.
Twenty-second Annual Report of the British West Indies Central Sugar Cane Breeding Station for the year ending September 30th, 1955, pp. 50.

In the third year seedling first ratoon trials B.49119 was outstanding. In the select seedling first and second ratoon trials B.4744 and B.47419 were prominent. B.45151 has given good cane yields in the high and intermediate rainfall areas, and B.41211 has shown up best in the low and intermediate rainfall areas where rats are not prevalent.

1933. Méndez-Roig, F., and Samuels, G.
Sugarcane variety trials in Puerto Rico, 1951-55. [Spanish summary 1 p.]
J. Agric. Univ. P.R., 1957, **41**: 147-60, bibl. 3.

In the production of available 96° sugar per acre B.37161 was the outstanding variety of east and north central cane areas of the island, while P.R.980 was the leading variety in the northwest, west, south and the interior of Puerto Rico. B.40105, B.37172, B.41227, H.38560 and P.R.975 were also among the leading producers. In terms of tons of cane per acre, B.37161 and P.R.980 were the two leading varieties for the entire island. P.R.975 and B.4362 ranked first and second respectively in production of sucrose % cane and also produced a higher cane tonnage than the favoured commercial variety M.336 which ranked third. P.R.980 ranked first for tons of sugar produced per acre per month with a monthly production of 0·679 ton.

1934. Muthuswamy, R., and Aravamudhan, P.
Influence of dual-action seed treatments on late autumn planting of sugarcane in Bihar and Eastern Uttar Pradesh.
Indian Sugar, 1957, **7**: 523-6, bibl. 4.

In a randomized block experiment in which setts of Bo.17 were dipped in various organo-mercury fungicide/insecticide solutions before autumn planting, it was found that solutions containing Aretan/aldrin, Aretan/dieldrin or Aretan/chlordane were equal to Aretan in stimulating rapid germination. There was some indication that germination was also improved slightly by treatment with insecticides alone.—Messrs. Begg, Sutherland & Co. Pte Ltd., Marhowrah, Saran.
J.R.L.

1935. Singh, W.
Trial of modified Rayungun method of cane planting in Champaran, Bihar.
Indian J. Sugarcane Res., 1957, **1**: 234-5.
A note regarding the economics of modified Rayungun method of cane planting at Lauriya Farms.
Indian Sugar, 1957, **7**: 400-1.

The Rayungun method is a useful way of multiplying scarce and valuable varieties rapidly. It consists essentially of planting 3-bud setts in a nursery and 3–4 weeks later uprooting them and cutting them into 1-bud sprouts which are then planted in the field in the normal way. A trial, in which cane raised in this way was compared with cane raised in the usual way from 3-bud setts, did not reveal any significant differences in yield per acre or sucrose % juice. Costings based on this trial suggest that the single-bud planting method would be an economical proposition under irrigated conditions.—S.K.G. Sugar Ltd., Lauriya Farms, Champaran, Bihar.

1936. Dastane, N. G.
Evaluation of root efficiency in moisture extraction.
J. Aust. Inst. agric. Sci., 1957, **23**: 223-6, bibl. 4, illus.

In pot experiments 3 sugar cane varieties, though differing in drought tolerance, showed a similar capacity to extract soil moisture below the permanent wilting point. By the time that drought had killed the aerial portions all 3 varieties had reduced the soil moisture to about 2% below the wilting point. In a further experiment the drought-sensitive variety Pindar showed a much smaller capacity for extending its roots from a sand with high moisture tension into surrounding moist soil than did the drought-tolerant varieties Q.47 and C.P. 29/116.—Univ. Qd, Brisbane.

1937. Dastane, N. G.
A comparative study of water relations of drought tolerant and drought susceptible varieties of sugar cane.
Thesis Univ. Qd, summarized in *J. Aust. Inst. agric. Sci.*, 1957, **23**: 346-7.

Three varieties differing in drought tolerance were subjected to a wide range of studies [see also preceding abstract]. The results obtained showed, among other things, that: (1) The transpiration ratio of these varieties was not correlated with their moisture economy or drought tolerance. (2) Evapo-transpirational losses of all 3 varieties under conditions of abundant moisture supply were about 45 in. during an 11-month growing period. (3) Growth was depressed before the soil moisture reached wilting point. (4) The rate of increase of resistance of gypsum blocks embedded in the root zone remained uniform for all soil layers in which a certain minimum quantity of roots was present. (5) In descending order of moisture economy the varieties were CP. 29/116, Q. 47 and Pindar; in descending order of "hardiness", i.e. resistance to unfavourable environmental treatments such as frost, heat and root submergence, the varieties were Q. 47, C.P. 29/116 and Pindar. (6) Among various characters studied the only one clearly associated with "hardiness" was cell size.

1938. Mallik, A. K., and Venkataraman, S.
Elongation of sugarcane in relation to soil moisture.
Indian J. Sugarcane Res., 1957, **2**: 15-18, bibl. 5.

Growth measurements were carried out over 10 months on cane planted in the field and irrigated about once a fortnight and on comparable cane grown in large containers in which soil moisture was kept constant at 30% at 6 in. below the surface. In the field soil moisture at 6-in. and 12-in. depths fluctuated, but, except for two short periods, was kept well above the permanent wilting percentage (approx. 18%). The results showed that under very dry summer conditions the elongation of cane was checked at a point above the permanent wilting percentage. This effect, however, was temporary, and by the end of the season the field-grown plants were as tall as those grown in the containers.

1939. Hodnett, G. E.
The responses of sugar-cane to fertilizers.
Emp. J. exp. Agric., 1956, **24**: 1-19, bibl. 9, [omitted in error from *H.A.*, Vol. 26].

Average standardized responses of plant-canes and ratoons to nitrogen, phosphate, and potash were estimated from the results of over 1,000 experiments conducted in British Colonial and Commonwealth territories since about 1930. The responses (in terms of sugar) were examined in relation to ecological regions within each territory. Responses to organic manures, by-products, and lime were also summarized. Nitrogen responses were observed everywhere. Under irrigation they were usually larger, while the ratoons generally responded more than the plant-canes. No residual response was observed. The sugar percentage was consistently reduced. Sulphate of ammonia appears to be the most effective form of nitrogen fertilizer. With phosphate, the responses tended to be associated with soil types. They were generally rather small, and similar with successive crops. The effect on the sugar percentage was small and irregular. Responses to potash were also associated with soil types and to some extent with rainfall. The ratoons tended to give somewhat higher responses than the plant-canes. Potash usually increased the sugar percentage. Small, positive interactions were found between nitrogen and phosphate and between nitrogen and potash. Pen manure tended to reduce the responses to the main inorganic fertilizers. There was no evidence for interactions between fertilizers and varieties. [Author's summary.]—Rothamsted exp. Stat., Harpenden, England.

1940. Pimentel Gomes, F., and Salati, E.
As interações num grupo de experimentos de adubação de cana de açúcar. **(Interactions in a group of sugar cane fertilizer experiments.)** [English summary 1 p.]
Rev. Agric. Piracicaba, 1957, **32**: 261-70, bibl. 4.

An analysis of the results of 38 $3\times3\times3$ NPK factorial experiments carried out in Brazil on both plant and first ratoon canes has revealed positive interactions between N and P and between P and K but not between N and K [as reported in the preceding abstract].—Esc. sup. Agric. "Luiz de Queiroz", Univ. S. Paulo.

1941. Innes, R. F., Thompson, H. M., and Wightman, G. M.
Some further considerations on the diagnosis of sugar cane nutritional deficiencies under Jamaica conditions.
J. Jamaican Ass. Sugar Tech., *1956*, [1957], **19**: 1-12, bibl. 6.

In a study of the relationship between sugar yield and leaf or stalk composition, yield was found to be better correlated with the N content of the upper internodes, especially at 4–5 months, than with leaf N at 5 months. When P and K nutrition was adequate, stalk composition reflected nutritional treatment better than leaf concentrations of these elements.

1942. Innes, R. F., Chinloy, T., and Thompson, H. M.
An evaluation of aqueous ammonia as a source of nitrogen for sugar cane in Jamaica.
J. Jamaican Ass. Sugar Tech., 1956, [1957], **19**: 16-31, bibl. 10.

In laboratory trials ammonia losses were small when aqueous ammonia was injected below the surface. Light and calcareous soils were most prone to loss. In field experiments, however, aqueous ammonia injected 6 in. deep by tractor-drawn tines was only about 70% as effective as broadcast sulphate of ammonia, in terms of cane yield. Buried ammonium sulphate should be still more effective especially in calcareous soils.

1943. Khanna, K. L., Acharya, R. C., and Singh, K. P.
Studies on the manurial responses of sugarcane on cultivators' fields. III. The effect of top dressing of ammonium sulphate, ammonium chloride and urea.
Indian J. Sugarcane Res., 1957, **1**: 189-96, bibl. 5.

The results are summarized of 2,672 trials carried out in 1955–56 in Bihar, in which N was applied at 4 levels (0, 20, 40 and 80 lb. per acre). In 2,154 trials ammonium sulphate was used, in 124 ammonium chloride and in 394 urea. With ammonium sulphate average yield increases from doses of 20, 40 and 80 lb. N worked out at 3·4, 6·5, and 10·7 tons; corresponding figures for ammonium chloride were 2·8, 5·4 and 8·3 tons, and for urea 3·4, 6·8 and 10·4 tons. After standardizing all responses to a level of 20 lb. N the mean profits for the State accruing from this dosage worked out at Rs. 84/–, Rs. 71/– and Rs. 81/– per acre for ammonium sulphate, ammonium chloride and urea respectively. The three N sources differed somewhat in effectiveness in different districts and on different soils.—Cent. Sugarcane Res. Stat., Pusa.

1944. Vijayasaradhy, M., and Vanithamony, P.
Experimental studies of the factors controlling flowering in sugarcane. II. Effect of extra dark treatment in relation to age and month of planting.
Indian J. Sugarcane Res., 1957, **1**: 210-19, bibl. 14, illus.

Under normal days as well as under 4 hours' extra dark treatment there was a progressive decline in the number of days to flowering in plantings of February to May and June to January. The effectiveness of the dark treatment increased with the age of the plants to which it was applied. There was a significant negative correlation between the number of days to flowering and the rate of growth. Sugarcane can be made to flower throughout the year by adjusting the time of planting and applying the extra dark treatment at the proper age of the plant. [From authors' summary. For part I see *H.A.*, 28: 925.]—Sugarcane Breed. Inst., Coimbatore.

1945. Antoine, R.
A staining technique for detecting ratoon stunting disease in sugar cane.
Nature, 1958, **181**: 276-7, bibl. 6.

The technique described is based on the treatment of slices of cane stalk with a 0·5% solution of 2,3,5-triphenyl tetrazolium chloride, extracting the insoluble red formazan formed with acetone, and determining the optical density of the extract. The method, which is applicable only to mature cane, requires careful selection of stalk tissue from just above the leaf-trace bundles and the maintenance of carefully controlled conditions during the test. Where such conditions have been fulfilled, it has given disease assessments in close agreement with those obtained from macroscopic nodal symptoms. Other tetrazolium salts tested have not shown promise.—Sugar Ind. Res. Inst., Mauritius.

1946. Anon.
Heat treatment limits stunting disease.
Sugar, N. York, 1957, **52**(10): 27-8, illus.

In Louisiana and Hawaii ratoon stunting disease control is effected by hot-air treatment at 54° C. for 8 hours. The air is circulated through boxes over electric elements thermostatically controlled. This method is preferred to the usual hot-water treatment, which tends to soften the buds, alter the moisture content of the cuttings and make them susceptible to mechanical damage. Data are tabulated showing the substantial yield increases given by plant and first ratoon crops of 3 varieties in Louisiana following hot-air treatment.

1947. Mehta, P. P., and Sinha, R. N.
Sources of red rot infection: some observations in North Bihar.
Indian Sugar, 1957, **7**: 337-40, bibl. 3.

In observations on 8 farms 4 types of primary and secondary red rot infection were recognized. Irrigation water and infected soil were found to be less common causes of infection than diseased setts. With all varieties primary infection accounted for 80% of the diseased plants.—Cent. Sugarcane Res. Stat., Pusa, Bihar. J.R.L.

1948. Kar, K., and Srivastava, D. D.
Fungicidal treatment of sugarcane setts.
Indian Sugar, 1957, **7**: 333-5, bibl. 4.

Experiments showed that sugar cane setts dipped in sulphur, copper or mercuric chloride fungicides before planting were not protected against red rot infection from contaminated soil water. In 2 trials against smut, however, the percentage of plants infected was reduced from 5·7–6·2 to 0·0–1·1 by using Perenox and Agrosan G.N. dips.—Sugarcane Res. Stat., Shahjahanpur. J.R.L.

1949. Sastry, K. S. S.
Some potential insect pests of sugarcane in Mysore.
Mysore agric. Cal. 1956-57, 1957, pp. 129-35, bibl. 5.

The sugar cane leaf hopper (*Dictyophora pallida*) was also found on cereals and grasses. The most effective agents of biological control were *Tetrastichus pyrillae*, *Ooencyrtus papilionis*, *Dryinus pyrillae* and tiger beetles. Chemical control was successful with 0·05% DDT spray or 5% BHC dust mixed with wood ash, but these treatments seriously checked biological control. The mealybug *Saccharicoccus sacchari* is parasitized to an average of 50% by *Anagyrus saccharicola* and checked by several predators. Treatment recommended for setts is soaking for 24–48 hours in a 1/800 solution of nicotine sulphate containing 2 lb. of soap per 500 gal. After planting, oil emulsions or calcium polysulphide in water can be applied to plant bases. The white fly *Neomaskellia bergii* is largely checked by natural enemies, but sporadic dense infestations can be controlled by 0·05% Folidol E 605 or 1 lb. of 50%-active BHC per 16–20 gal. of water. The green jassid *Tettigella spectra* may be controlled by light traps and bagging. The sugar cane mite *Paratetranychus indicus* was effectively controlled by dusting with a 1 : 4 mixture of sulphur and wood ash.

1950. Siddiqi, Z. A.
Effective control of shoot-borers of sugarcane by soil application of gamma BHC liquid.
Curr. Sci., 1957, **26**: 393-4, bibl. 1.

Chilotraea infuscatellus, *Raphimatopus ablutella* and *Emmalocera depressella* were controlled by gamma BHC at 1·25 lb./acre applied as an emulsion at 180 gal./acre poured over the setts at planting.—Main Sugarcane Res. Stat., Shahjahanpur.

1951. Puzzi, D., and Andrade, A. C.
O percevejo castanho—*Scaptocoris castaneus* (Perty)—no estado de São Paulo. **(The chestnut-brown bug, *Scaptocoris castaneus,* in São Paulo state.)**
Biológico, 1957, **23**: 157-62, illus.

Hosts include sugar cane and beans, particularly the former. Control necessitates soil treatment. Good results, without injury to the sugar cane crop, were obtained by mixing an insecticide, or insecticide + fertilizer, with the soil in newly opened furrows before planting the setts, using the following quantities per m. of furrow: 3 g. of either 10%-active chlorinated camphene or 2·5%-active aldrin, or 6 g. of either 1% γ isomer BHC or 10%-active chlordane. In heavily infested areas, particularly where weeds abound, an additional previous treatment was necessary, incorporating either of the first two insecticides at 144 kg. per alqueire (2·42 ha.) or either of the second two at 288 kg. per alqueire, 7½–15 cm. below the soil surface. Infestation by weeds and the pest, and accumulation of insecticide in the soil are all reduced by opening the furrows for the new crop between those used for the previous crop.

1952. Prasad, S. N., and Butani, D. K.
Laboratory trials on the chemical control of sugarcane leaf hopper (*Pyrilla perpusilla* Walker).
Indian J. Sugarcane Res., 1957, **1**: 197-201, bibl. 4.

In preliminary laboratory trials with various insecticides, applied as dusts and sprays, against *P. perpusilla* very good results were given by 5% toxaphene dust and good results by 5% BHC and DDT dusts. Sprays of the same compounds and of parathion and Rhodiatox were less effective.—Cent. Sugarcane Res. Stat., Pusa.

1953. Siddiqi, Z. A.
Field tests of Swingfog machine for the control of external pests of sugarcane.
Indian J. Sugarcane Res., 1957, **2**: 43-6, bibl. 5, illus.

Endrin 20% emulsifiable concentrate, at 8–12 oz. in 2 gal. kerosene fogged over 1 acre, controlled *Pyrilla* leafhoppers, and 1 lb. of concentrate controlled lygaeid bugs. DDT at 1 lb./acre did not fully control *Pyrilla* and was somewhat phytotoxic. Folidol and Basudin phosphorus insecticides were ineffective as fogs. The costings and efficiency of the machine are discussed.

1954. Thakur, C., Prasad, A. R., and Mahto, J.
The best method and time of application of aldrin and dieldrin against termites infesting sugarcane crop.
Indian J. Sugarcane Res., 1957, **1**: 223-6, bibl. 1.

In a field trial in 1954–55 on a termite-infested, calcareous soil on Pusa Farm aldrin and dieldrin, both at 1·5 lb. active material per acre, were applied at different times and in different ways. Applying the insecticides in the furrows, whether mixed with soil or applied over the setts, was more effective than incorporating the materials in the top soil or than dusting or soaking the setts. Application at planting time was more effective than post-planting application.—Cent. Sugarcane Res. Stat., Pusa.

1955. Anon.
Unique design of Louisiana's all-in-one harvester.
Sugar, N. York, 1957, **52**(9): 42, illus.

The U.S. Department of Agriculture has developed a combined harvester, stripper and loader for sugar cane. The machine is unpatented and costs about $18,000. It deals best with erect cane and is operated by a crew of two. There are 2 circular 35-in. cutters at the bottom and one 13-in. cutter above. A conical screw delivers the cane to a rubber chain which carries it through cutters and flexible rubber beaters to a towed wagon.

1956. Mouras, M. M.
Mechanical cane harvester developed in Brazil.
Sugar J., 1957, **20**(6): 14, 16, 40, illus.

This new mechanical cane cutter cuts 12 metric tons per hour and can replace 100 hand cutters. It is mounted on a low truck chassis and is powered by a Mercedes-Benz diesel motor of 105 H.P. The burnt cane is forced into angled grabs which carry it against bottom and top cutting discs and thence to the hopper. Here over a ton may be stored until carts come alongside. These travel at the same speed as the cutter. The machine is built of standard truck parts. The patent rights belong to the Société de Sucreries Brésiliennes, S. Paulo Capital, Brazil.

1957. Trippi, V. S., Mesías, J. R., and del Frari, H.
Fisiología del deterioro de cañas estacionadas y los efectos del 2,4-D. **(Physiology of the deterioration of stored sugar cane and the effects of 2,4-D.)** [English summary ½ p.]
Rev. industr. agríc. Tucumán, 1957, **41**: 3-14, bibl. 23.

Sugar cane deteriorated more rapidly when kept in dry than in moist conditions. Exposure to sun accelerated sucrose inversion. Treatment with 2,4-D at concentrations of 200–6,400 mg./l. retarded inversion, the effect increasing in general with the concentration. Maintenance of a moist atmosphere by periodical sprinkling of the cane bundles and the use of trash as a covering were far more effective than 2,4-D treatment in preventing heavy reductions in final yield.

1958. Tandon, R. K., and Bhoj, R. L.
Some observations on leftover sugarcane in the succeeding crushing season.
Indian Sugar, 1957, **7**: 467-71, bibl. 3.

A study was made to ascertain whether cane, left over unharvested from the previous season, was inferior to the current crop. Height measurements showed that early varieties deteriorated more than mid-season canes. In juice quality, samples from low lying fields were less satisfactory than those from well drained fields, which were superior to current-year plant and ratoon crops. Deterioration was greater when the left-over cane was crushed late in the succeeding season.—Sugarcane Res. Stat., Shahjahanpur.

Tea.

(*See also* 1025, 1041, 1082b, 1997d, x-z, 1998a, b, e, 1999f, g, v, 2057.)

1959. Tea Research Institute of Ceylon.
Annual Report of the Tea Research Institute of Ceylon for the year 1956, being *Bull.* **38**, 1957, pp. 68.

Progress in 1956 was somewhat restricted by staff changes. The work reported includes: *Chemistry:* Studies on seasonal variations in the ammonia and nitrate balance in soils in the presence of active tea roots are in progress. *Technology:* Small scale manufacture is being applied to leaf from individual high yielding clones. Four such clones, Nos. 777, 1114, 1526 and 2024 have produced teas valued higher than the tea made from one of the best fields at St. Coombs. *Physiology:* In one NPK factorial fertilizer experiment it was shown that proper manuring will counteract to some extent the tendency of the shoots to become temporarily dormant, and that the proportion of banji shoots can only be effectively decreased if all 3 nutrients are present in adequate quantities. Tea pollen retained its viability for at least 5 months when stored at 40% relative humidity. Cracking and soaking tea seeds reduced the time taken to reach a 75% germination by 2 weeks and 10 days respectively. *Entomology:* A 1% solution of Teepol was as effective as soap when diluted at 1 lb. in 10–20 gal. water for the control of a nettle grub, *Thosea recta*; endrin at 1 pt. in 15 gal. gave the highest mortality of this caterpillar. A search for clones showing resistance to shot-hole borer, *Xyleborus fornicatus*, has been started.

1960. Tea Research Institute of East Africa.
Annual Report of the Tea Research Institute of East Africa for 1956, 1957, pp. 42.

Agricultural Department. Manuring: In 2 experiments with second cycle tea, yields were again smaller with 80 lb. N per acre than with 40 lb. or 120 lb. N per acre; mulching continued to give beneficial results; urea appeared to be a satisfactory substitute for sulphate of ammonia. *Growth of tea plant:* Preliminary results of several pruning cycles on mature, unshaded tea showed a steady increase in the proportion of wood formed, a reduction from the first to the second year in the foliage, and an increase in the flush percentage up to the second year only; a high level of watering resulted in the best growth of cuttings. *Weedkillers:* Dowpon at 15 lb./acre applied to plots where *Digitaria* had been cut to 6 inches gave effective control. *Chemical Department.* Work has been mainly on soils.

1961. Indian Tea Association, Tocklai.
Annual Report of the Indian Tea Association, Scientific Department, Tocklai Experimental Station for 1956, [1957], pp. 168.

Investigations are reported on: *Physico-chemical branch:* Physical analyses of soils; availability of phosphatic fertilizers; chlorine uptake by the tea plant. *Botanical branch:* Morphology and taxonomy; light intensity studies. *Agricultural branch:* Several fertilizer experiments are reported, P and K again failing to increase yield and quality; mechanical harvesting; pruning studies; manuring of bamboos. *Entomological section:* Looper caterpillar, for which endrin 1 in 1,000 at 150 gal./acre gave effective control; helopeltis; bunch caterpillars, for which lindane and endrin were most effective; orange mite; green caterpillar, for which dieldrin, lindane and endrin were effective; red spider; tainting effects of pesticides. *Mycological section:* Black rot; brown root rot; charcoal stump rot; tea flower disease; eelworms. *Biochemical branch:* Changes during withering; chemical basis of quality; manufacturing experiments. *Engineering development branch:* Withering and rolling machines; mechanical harvesting and pruning. *Chemical laboratory:* Studies of thearubigins and theaflavins. [See also separate abstracts below.]

1962. Harada, S., Toyao, T., and Inaba, T.
Studies on the utilization of polyploidy in the tea plant. (Part 1.) [Japanese, with English summary ⅓ p.]
Study of Tea, Tôkai-Kinki agric. Exp. Stat., Tea Div., 1957, No. 17, pp. 7-12, bibl. 7, illus.

Tetraploid tea plants have been obtained by treating the growing point of diploid seedlings with colchicine and by sowing seeds from triploid plants. In both cases the plants were large, but the induced tetraploids possessed leaf characters which in some respects resembled those of their diploid parents. Among the colchicine treated plants one mixoploid plant containing both 4n and 2n cells was found. J.R.L.

1963. G[lover], P. M.
Green cropping programme for shading tea seed nurseries.
Ser. Tea Res. Inst. Tocklai **59/2**, 1957, pp. 3.

Crotalaria anagyroides is best sown a year ahead of the tea and lopped and removed gradually as the tea seedlings develop. Except in areas subject to drought, the final clearance of the shade crop should take place when the tea seedlings are about 9 months old. *Priotropis cytisoides* is another plant which can be used for this purpose, but *Desmodium gyroides* and *Tephrosia candida* should not be used, because of their susceptibility to nematodes and red rust respectively.

1964. Veeraraghavan, R.
Layers to fill up gaps in tea plantations.
Venkataramani, K. S.
Some comments on layering and budding of tea.
Plant. Chron., 1957, **52**: 604-5, illus., and 702-3.

The first author suggests that where single gaps occur a sucker from an adjacent bush may be layered to provide a replacement. For large vacant patches layers are raised round nearby bushes in the year before pruning, and transplanted after becoming established in the first season after pruning. Layers may be raised from old bushes when an uneconomic plantation is to be replanted. The second author comments on these suggestions and concludes that propagation by cuttings remains the most satisfactory method of multiplying tea rapidly.

1965. Dutta, S. K.
Experiments on the spacing and arrangement of tea.
Two and a Bud, 1957, **4**(1): 3-8.

The common spacing in N.E. India provides 2,700–2,800 bushes per acre. Closer spacing of 2 ft. × 5 ft. increased yields by 25·67% in a vigorous clone and by 34·16% in a weak clone over 4 ft. × 5 ft. spacing. In another experiment the increase in yield of tea spaced to give 3,440 bushes per acre over tea at 2,700 bushes per acre was reduced to nil after 3 years, and that of tea at 4,590 bushes per acre after 6 years. Tea at 5,460 bushes per acre was still giving a slightly higher yield per acre at the close of the experiment. The author recommends closer planting than is common at present so as to bring tea into economic bearing earlier, and he considers that the resultant increase in yield may continue for up to 10 years. The actual spacing must depend on the vigour of the tea, soil fertility, etc.

1966. Glover, P. M.
Practical aspects of spacing and arrangement of tea plants in commercial tea estates.
Two and a Bud, 1957, **4**(1): 9-14.

Hedge planting is recommended at 5 ft. × 2½ ft. (3,440 bushes per acre) on rich soils with naturally spreading varieties, and at 5 ft. × 2 ft. (4,330 bushes per acre) in less favourable or replanted areas. Hedge planting has several advantages, including suitability for possible mechanisation methods, erosion control, continuous high density plucking surface, easier spraying and disease control. Nearly all large tea estates in Assam have adopted hedge planting.

1967. Flémal, J.
La plantation du théier en lignes doubles le long des courbes de niveau. (**Planting tea in double rows along the contour.**)
Bull. Inf. I.N.E.A.C., 1957, **6**: 365-79, illus.

A row spacing of 0·75 m. in paired staggered rows, 0·75 m. apart, separated by 1·50 m. from the next pair and running across the slope, is recommended for tea at Kivu in the Congo. For steep slopes closer planting in the row is suggested. The author provides detailed instructions for laying out the plantation, having regard to erosion control, and an estimate of the manual labour involved.

1968. Barua, D. N.
Light intensity, assimilation rate and yield of young tea plants.
A.R. Indian Tea Ass., sci. Dep., Tocklai, 1956, pp. 34-46.

Four clones were grown under bamboo mesh screens transmitting 3 levels of reduced light and in full light. Screening made little difference to air temperatures but moderate shade kept soil temperatures more uniform throughout the year. Soil moisture increased with reduced light intensity, but humidity and CO_2 concentration were not noticeably affected. Reduced light intensity caused a reduction in the dry weight of the whole plant and an increase in leaf area per plant, but no significant association was observed between light intensity and either weight of roots or the top/root ratio. Net assimilation rate was linearly related to the logarithm of light intensity. Yield of plucked shoots was least in full sun and highest in 50% light which is considered to be the lower limit for optimum growth of the tea plant.

1969. Harada, S., Kanoo, T., and Sakai, S.
Studies on photosynthesis of the tea plant. (Part 2.) On the diurnal and seasonal changes in the assimilation rate of the tea plant. [Japanese, with English summary ⅓ p.]
Study of Tea, Tôkai-Kinki agric. Exp. Stat., Tea Div., 1957, No. 17, pp. 1-6, bibl. 6.

Using apparatus previously described [*H.A.*, 27: 2971] the authors found that the rate of carbon assimilation increased during each day as the light intensity increased, reached a maximum between 8 and 10 a.m., remained nearly constant until 3–4 p.m., and then decreased. No reason could be found for a "midday depression" often observed in summer and autumn. The light saturation point was found to be about 0·5 cal./min./cm.^{2} in summer and autumn but a little lower in winter. When the light intensity exceeded 0·4 cal./min./cm.^{2} the carbon assimilation rate decreased with a rise in temperature. Carbon assimilation per day decreased markedly in the winter. [For part 1 see *H.A.*, 27: 2971.] J.R.L.

1970. D[utta], S. K.
N.P.K. manuring of tea seed nurseries.
Ser. Tea Res. Inst. Tocklai **115**, 1957, pp. 2.

In a trial at Borbhetta the best results were obtained with 12 fortnightly applications of a mixture consisting of 1 part by weight of sulphate of ammonia, 2 parts superphosphate and 1¼ parts sulphate of potash (≡N : P : K at 1 : 2 : 3) at 1½ oz. per 100 sq. ft. of bed. A 1 : 2 : 2 mixture was cheaper and also quite suitable.

1971. Ferguson, H., Gokhale, N. G., and Dutta, S. K.
Urea and ammonium sulphate nitrate.
Two and a Bud, 1957, **4**(2): 3.

A field trial indicated that urea had 90% of the efficiency of ammonium sulphate at equivalent rates of N. Both urea and ammonium sulphate nitrate are suitable for tea in N.E. India but, although cheaper, are more hygroscopic than ammonium sulphate and therefore more difficult to handle.

1972. Gokhale, N. G.
Calcium economy of tea soils under prolonged sulphate of ammonia treatment.
A.R. Indian Tea Ass., sci. Dep., Tocklai, 1956, pp. 16-20.
Effects of sulphate of ammonia treatment on soil acidity and calcium content.
Two and a Bud, 1957, **4**(2): 4.

Using the sites of field experiments in which ammonium sulphate had been applied at different levels for 14 and 20 years, soil samples were drawn from 4 depths down to 36 ins. Significant reductions in calcium content, directly proportional to the quantity of ammonium sulphate applied, were observed. Quantitative estimates of the calcium losses, expressed as lb. calcium carbonate for every 100 lb. ammonium sulphate applied, varied between 22 and 34 lb. for the top 3 ft. Where ammonium sulphate, at 90 lb. N/acre, was applied for 13 years to a sandy loam, pH, in the top 3 ft. of soil, fell to 4·15, compared with 4·55 in control plots. In another experiment, pH fell to 4·00 in the top 18 in. after 20 years' application.

1973. Gokhale, N. G.
Rate of calcium loss resulting from ammonium sulphate treatment of a tea soil.
Nature, 1958, **191**: 426-7, bibl. 5.

It would appear that when ammonium sulphate is applied to tea growing on an acid soil N is absorbed in the form of ammonia. Both the amount of N absorbed and the yield response to N are greater in unshaded than in shaded tea. A higher proportion of applied N appears to remain unrecovered in the case of shaded tea and this could explain why the rate of Ca loss from tea soils is higher in shaded than in open areas.—Tocklai exp. Stat., Assam.

1974. Goodchild, N. A.
The manuring of tea in East Africa.
Pamphl. Tea Res. Inst. E. Afr. **13**, 1957, pp. 23-32.

Preliminary results from fertilizer experiments indicated that in all districts unshaded tea will respond to 40 lb. of N per acre, and, in places, higher doses may also be economic. Shaded tea has not responded to N. There have been no responses to P except as an interaction with a mulching treatment in a low rainfall area. K has caused no responses. S is necessary in S. Tanganyika and is available in ammonium sulphate.

1975. Gusejnov, R. K.
The effect of mineral fertilizers on the productivity of tea plantations in Lenkoransk zone of the Azerbajdžan SSR. [Russian.]
Bjul. Vses. n.-i. In-ta Čaja i subtrop. Kul'tur, 1956, No. 3, pp. 23-9, from abstr. in *Ref. Ž. (Biol.)*, 1957, No. 14, Abstr. 60,856.

A study was conducted on the effect of mineral fertilizers on tea during the year of application and in subsequent years. Over 3 years a single application of N at 180–360 kg./ha. gave an average annual yield increment of 551–592 kg./ha. P_2O_5 at 180 kg./ha. gave an average annual yield increment of 629 kg./ha. High rates of K fertilizers (200–300 kg./ha. K_2O) showed long-term residual effects.

1976. Kawai, S., and Ikegaya, K.
Studies on the interrelation of various ions in nutrient absorption by tea plants. (Part 1.) Interrelation of calcium, potassium and magnesium in water culture solution. [Japanese, with English summary 14 lines.]
Study of Tea, Tôkai-Kinki agric. Exp. Stat., Tea Div., 1957, No. 17, pp. 48-50, bibl. 4.

It was found that increasing the Ca concentration of the culture solution increased the Ca content of the tea plant without affecting the Mg and K contents. Additional K in the solution reduced absorption of Ca and Mg. Antagonism of Mg towards K was also observed.
J.R.L.

1977. Chenery, E. M.
Boron deficiency in tea.
Nature, 1958, **181**: 426.

Boron deficiency symptoms developed by tea plants growing in pots containing B-deficient soils are described. They include brown spots on the petioles and laminae of new shoots, followed by distortion of leaves and the development of corky excrescences on the petioles. Internodes were reduced in length and the growing points finally died. So far as is known these symptoms have not been encountered in the field.—Kawanda Res. Stat., Kampala, Uganda.

1978. Dutta, S. K.
Treatment of medium pruned tea.
A.R. Indian Tea Ass., sci. Dep., Tocklai, 1956, pp. 76-81.

In order to mitigate the shock and consequent crop loss due to medium pruning [*H.A.*, 27: 2973], the effects of resting, manuring, and of time and height of pruning were studied. It was observed that a significant reduction in yield resulted from resting for a year after medium pruning, from pruning in April rather than in October, and from pruning in November with no manure rather than pruning in October and applying N. Manuring with a 1 : 2 : 2 NPK mixture, including 80 lb. N/acre, caused increased yields compared with N alone at 80 lb./acre. It is better to manure medium pruned tea after pruning, when 3 leaves have been formed, than 1 month before pruning.

1979. G[lover], P. M., D[utta], S. K., and S[armah], K. C.
Hail damage on tea estates.
Ser. Tea Res. Inst. Tocklai **36/2**, 1957, pp. 4.

Hail damage is most serious in young and unprotected tea when the bark is affected. Immediate fungicidal spraying to prevent the entry of *Nectria* and other pathogens is essential. Severely damaged bushes should be plucked only very lightly, and, after new growth has commenced, a nitrogenous fertilizer should be applied. Cover crops, shade trees and wind breaks are desirable in areas where hail damage is frequent.

1980. Minamikawa, J., Ueda, K., and Osakabe, M.
The spray injury of insecticides on the tea plant. (Part 1.) [Japanese, with English summary 11 lines.]
Study of Tea, Tôkai-Kinki agric. Exp. Stat., Tea Div., 1957, No. 17, pp. 13-16.

The repeated application of lime sulphur before the opening of the buds in March had no adverse effect on development of the plants or on the yield obtained. Winter application of 0·8–1·0% lubricating oil emulsion caused no injury, but sprays of 4·0–6·0% emulsion caused serious damage to the buds and reduced the spring crop by a half. [See also *H.A.*, 27: 944.]
J.R.L.

1981. Foster-Barham, C. B.
Tea mosquito bug (*Helopeltis* spp.).
Quart. Circ. Tea Res. Inst. E. Afr., 1957, **1**: 29-33.

Several *Helopeltis* species have caused outbreaks of gnarled stem canker. Damage is two-fold, to the leaf and, more seriously, to the stem, which leads to dieback. Control is achieved by reducing overhead shade or by DDT sprays or dusts.

1982. Child, R.
The inorganic constituents of tea leaf, in relation to bush nutrition.
Pamphl. Tea Res. Inst. E. Afr. **13**, 1957, pp. 14-22.

The principal mineral constituents of tea are discussed. Typical Kericho-grown dry leaf contains 2·40% K_2O, 0·71% CaO, 0·56% MgO, 0·68% P_2O_5, 0·20% SO_3, 0·15% Mn, 0·05% Al, 70 p.p.m. Fe, 15 p.p.m. Cu and 26 p.p.m. Zn.

1983. Torii, H., and Washiyama, H.
Sample form for determining chemical constituents of tea leaf. [Japanese, with English summary ½ p.]
Study of Tea, Tôkai-Kinki agric. Exp. Stat., Tea Div., 1957, No. 17, pp. 30-5, bibl. 1.

Sampling studies suggest that for determining total N and tannins no advantage is gained by dividing shoots into individual 1st, 2nd and 3rd leaves. During daily sampling of one variety in the third plucking season total N remained constant in shoots ranging from 20 to 70% mature. With tannin values the coefficient of variation could be reduced by adjusting them in relation to shoot maturity.

1984. Chanda, N. B.
Tea catechins.
Two and a Bud, 1957, **4**(2): 5.

High catechin content is desirable and is affected by weather, pruning treatment, etc. In Assam average catechin contents on a dry weight basis are: buds 26·5%, the 1st, 2nd and 3rd leaves 25·9%, 20·7%, and 17·1% respectively, and the upper and lower stems 11·5% and 5·3%.

1985. Lamb, J., Ramaswamy, M. S., and Mendis, V.
Studies on the 'fermentation' of Ceylon tea. IX. A preliminary investigation on the volatile constituents of tea leaf.
J. Sci. Food Agric., 1958, **9**: 43-6, bibl. 5.

Examination of steam distillates from tea leaves showed that the amount of $KMnO_4$-oxidizable constituents decreased during the fermentation process. Methanol was present in the distillate and its content was greatly increased by steam distillation from acid or alkaline solution. The methanol present is attributed to hydrolysis of pectin in the leaf by the acids or alkali, or by enzymes in the leaf in neutral distillations. The amount of methanol is present in the distillate in amounts far in excess of those of the substances responsible for the tea aroma. [Authors' abstract.]—Tea Res. Inst. Ceylon.

1986. Ramaswamy, M. S., and Lamb, J.
Studies on the 'fermentation' of Ceylon tea. X. Pectic enzymes in tea leaf.
J. Sci. Food Agric., 1958, **9**: 46-51, bibl. 6.

Fermenting tea leaf produces methanol as the result of enzymic demethylation of pectins contained in the leaf. The enzyme concerned (which was isolated and purified) is very similar to pectin-methylesterases found in other plants. The activity of tea pectin-methylesterase is partially inhibited by tea catechins and their oxidation products, but nevertheless a continuous demethylation process gives rise to pectic acid during the course of fermentation. In one particular case, a leaf mass exceptionally rich in pectin and pectase gave indications of gel formation. The significance of the pectic acid formed during tea 'fermentation' is discussed. [Authors' abstract.]—Tea Res. Inst. Ceylon.

1987. Lamb, J., and Ramaswamy, M. S.
Studies on the 'fermentation' of Ceylon tea. XI. Relations between the polyphenol oxidase activity and pectin-methylesterase activity.
J. Sci. Food Agric., 1958, **9**: 51-6, bibl. 5.

By initially withholding the oxygen supply to fermenting leaf, thus allowing the process of formation of pectic acid by pectin-methylesterase actions to proceed unhindered, it has been possible to demonstrate a reduction of oxygen uptake when the oxygen supply is restored. Addition of pectin to tea leaf both reduces oxygen uptake during fermentation and yields tea reported by tea tasters as under-fermented. It is concluded that there is strong presumptive evidence that the rate of fermentation of Ceylon tea is in some degree regulated by the pectic substances and enzymes which occur in the leaf. [Authors' abstract.]—Tea Res. Inst. Ceylon.

1988. Džemuhadze, K. M., Šal'neva, G. A., and Mileško, L. F.
Changes in catechins during the fermentation of tea. [Russian, with English summary 10 lines.]
Biohimija, 1957, **22**: 888-93, bibl. 20.

The gallic esters of catechins, mainly *l*-epigallocatechingallate, decreased at an almost uniform rate throughout fermentation. The content of simple catechins fluctuated but after 3 hours' fermentation decreased rapidly. In the final product simple catechins were absent and the amount of the esters remaining was insignificant. [See also *H.A.*, 28: 952.]

Sundry crops.

(*See also* 1998o, p, 1999d, j.)

1989. del Campillo, A., and Asenjo, C. F.
The distribution of ascorbic acid, dehydroascorbic acid and diketogulonic acid in the acerola fruit at different stages of development. [Spanish summary ½ p.]
J. Agric. Univ. P.R., 1957, **41**: 161-6, bibl. 10.

The values obtained for ascorbic acid (AA), dehydroascorbic acid (DHA) and diketogulonic acid (DKA) at different stages of fruit growth indicated that AA is fairly stable in the acerola fruit (*Malpighia punicifolia*) and that the small contents of DHA and DKA, especially of the second, are products of decomposition rather than of normal metabolism. In the fresh fruit at all stages of development the content of AA was never below 90% of the sum of the 3 components studied. During the formation of the rudimentary fruit there was a rapid increase in AA, and in the red-ripe fruit there was a significant lowering of AA content. [From authors' summary. See also *H.A.*, 27: 3991.]

1990. Bavappa. K. V. A., Patel, G. L., and Bhat, K. S.
Germination and vigour of seedlings as influenced by the quality of seed arecanut.
Arecanut J., 1957, **8**: 27-31, bibl. 5.

Although the final overall germination percentage of arecanuts from 176 individual bunches was as high as 94·7, there were marked differences between nuts from different bunches in the number of days taken both to start and to complete germination. The importance of this lies in the fact that nuts which germinated early produced significantly more vigorous seedlings than nuts which germinated late.—Cent. Arecanut Res. Stat., Vittal.

1991. Khan, K. F.
Let's produce more cashewnuts.
Indian Fmg, 1957, 7(7): 36-7.

As part of an effort to increase greatly the production of cashew nuts in India, investigations are now in progress at research stations at Mangalore (Mysore), Kottarakara (Kerala) and Bapatla (Andhra Pradesh). At Mangalore air-layering has proved an easy way of multiplying selected trees, and plants raised in this way came into bearing in 20 months compared with the 4 years usually taken by seedlings.—Indian Coun. agric. Res.

1992. Rao, V. N. M., Rao, I. K. S., and Hassan, M. V.
Studies on certain aspects of germination of seeds in cashew *(Anacardium occidentale* Linn.).
Indian J. agric. Sci., 1957, **27**: 25-34, bibl. 5.

Trials conducted at the Central Cashewnut Research Station, Mangalore, during 1954–55 gave the following main results: There was no appreciable difference in the germination of seeds collected during 5 different periods in the cropping season and sown simultaneously. Seeds not fully mature showed no particular advantage over those fully mature. Sowing the seeds with the stalk end facing upwards and in a slanting position gave a high percentage of germination and should reduce attacks by birds or animals on the fleshy cotyledons. Seeds sown 2 or 3 in. deep gave the best results; sowing deeper than 3 in. was detrimental.

1993. Philippe, J.
Essais de reproduction végétative du "nsafu", *Dacryodes* (*Pachylobus*) *edulis.* **(Experimental vegetative reproduction of *Dacryodes (Pachylobus) edulis.***
Bull. Inf. I.N.E.A.C., 1957, **6**: 319-27, illus.

This tropical African tree resembles the mango. The plum-like fruits, borne in clusters, are red or greenish yellow when young and dark violet when mature. The pulp can be boiled or baked and the kernel is rich in oil. It is a well established orchard crop of the Lower Congo, but, as it is always grown from seed, a multiplicity of varieties exists, some of which are poor. The usefulness of the fruit justifies selection and the propagation of superior varieties, and the present paper records attempts at vegetative propagation. Several methods, cuttings, grafting, etc., were tried, but the plant does not readily produce adventitious roots. Good results were had with air-layering, however, even without the use of growth substances, and the method is described in detail.

1994. Raman, K. R.
A note on the propagation of jack on individual jack tree selections as rootstocks in grafting.
South Indian Hort., 1957, **5**: 31-2, bibl. 6.

Seven superior jackfruit selections are described. Twelve seedlings of each of 6 of these were grown and inarched to seedlings of the seventh selection. Seed germination varied from 95 to 57% and the success of the inarching from 92% to a total failure. It is concluded that individual tree selection would encourage the growing of superior forms and increase the chances of better seed germination and more successful inarching. [See also *H.A.*, 27: 3993.]—Govt. Model Orchard cum Nursery, Periakulam. J.R.L.

1995. Trippi, V. S., and del Frari, H.
Influencia del acido alfa-naftalenacetico (NAA) sobre el desarollo de frutos en *Opuntia ficus-indica* Mill. **(Effect of alpha-naphthalene acetic acid (NAA) on the development of fruits in *Opuntia ficus-indica.*)** [English summary ½ p.]
Rev. agron. Noroeste argent., 1957, **2**: 401-9, bibl. 20, illus.

Flowers of *Opuntia ficus-indica* were treated with NAA at 20, 30, 80 and 100 mg. per l. in the hope of reducing the number of seeds per fruit. This objective was not achieved, but the lowest concentration increased fruit size and weight, increasing the weight of pulp by 53% and decreasing that of the pericarp. The stronger solutions also decreased the pericarp, but progressively reduced fruit size and pulp.

1996. Ruyssen, B.
Le karité au Soudan. **(The shea-butter tree in the Sudan.)** [English and Spanish summaries ½ p. each.]
Agron. trop., 1957, **12**: 143-72, 279-306, 415-40, bibl. 3, illus.

The occurrence and botany of the shea-butter tree (*Butyrospermum parkii*) in the Sudan are described, as are the preparation and use of its nuts and butter. It is concluded that, although the quality of the butter may be improved, its export will always be difficult.

1997. *Noted.*

a Aala, F. T.
Phil 49-22, a promising cane hybrid.
Sugar News, 1957, **33**: 591-3, illus.
High yielding and resistant to Fiji disease.

b ACHARYA, R. C., PRASAD, S. K., AND KHANNA, K. L.
Studies in sampling technique. VII.—Relative efficiency of systematic sampling for estimation of incidence (stalk-basis) of sugarcane borers in a field.
Indian J. Sugarcane Res., 1957, **1**: 227-9, bibl. 2.
Systematic selection more efficient than random; no correlation between expected efficiency and sample size.

c AGARWAL, R. A.
The sugar cane mite (*Schizotetranychus andropogonii* Hirst.) and its control.
Indian Sugar, 1957, **7**: 394-9, bibl. 20.
Of 6 insecticides tried, Folidol alone remained toxic for 13 days.

d ALKAN, B.
Teeschädlinge in der Türkei. **(Tea pests in Turkey.)**
Z. angew. Ent., 1957, **41**: 233-42, bibl. 13, illus.
Includes information on tea culture in Turkey.

e ALLEN, R. M.
A virus-type disease of Gros Michel bananas in Costa Rica. [Spanish summary 12 lines.]
Turrialba, 1957, **7**: 72-83, bibl. 21, illus.
Symptoms of "roxana" disease, which has features in common with rayadilla and bunchy top.

f ANON.
Four new "Q" canes.
Aust. Sugar J., 1957, **49**: 369, 371-2.
Main characteristics of Q.66, 67, 68 and 70 described.

g ANON.
Preparation of parchment using alkali.
Indian Coffee, 1957, **21**: 363.
Caustic soda at 10% aids removal of mucilage from coffee.

h ANON.
RRIM '600' clones—second series.
Plant. Bull. R.R.I.M., 1958, No. 34, pp. 22-4
Performance of clones RRIM 619 to 630, RRIM 623 showing most promise.

i ANON.
Shade reduction in existing cocoa.
Ghana Fmr, 1957, **1**: 182-3.
Poisoning with Trioxone in oil is the most effective method.

j BOLLE-JONES, E. W., MALLIKARJUNESWARA, V. R., AND RATNASINGAM, K.
Flame photometric determination of potassium and calcium and the chemical estimation of phosphorus, magnesium and manganese in leaves of hevea.
J. Rubb. Res. Inst. Malaya, 1957, **15**: 86-94, bibl. 12.
Methods used by the R.R.I.M. and their accuracy.

k CARBONELL, C. S.
Informe sobre el control biológico del barreno de la caña de azúcar, *Diatraea saccharalis.* **(Report on biological control of the sugar cane borer, *Diatraea saccharalis.*)**
Rev. Asoc. Ingen. agrón. Montevideo, 1957, **29**(100): 9-46, bibl. 10, illus.
A review of Peruvian work on the parasite *Paratheresia claripalpis.*

l CARRINGTON, P. L.
The effect of the new commercial varieties on the juice quality and yield on the alkaline soils of Shrewsbury section of The West Indies Sugar Company, Limited.
J. Jamaican Ass. Sugar Tech., 1956, [1957], **19**: 13-16.
B. 41227, 42231 and 4362 better than B. 34104 on wet, alkaline soil.

m CENTRALE PROEFSTATIONS VERENIGING.
Aanbevolen heveaplantmateriaal 1957/58. **(Recommended hevea planting material for 1957/58.)**
Bergcultures, 1957, **26**: 479-83.
For Java and Sumatra.

n DEOMANO, F. V.
Appraising the performance of sugar cane varieties at Pasumil.
Sugar News, 1957, **33**: 468-72, bibl. 3.
Among 25 varieties P.O.J. 3016 and 2878 led in sucrose % cane.

o DESNEUX, R.
Prospection des palmeraies et sélection du palmier à huile au Kwango. **(A survey of natural oil palm stands and selection work at Kwango.)**
Bull. Inf. I.N.E.A.C., 1957, **6**: 351-64, illus.
The criteria used and some of the results of selection work in the Belgian Congo.

p DUNSMORE, J. R.
The pineapple in Malaya *(Ananas comosus* Merr).
Malay. agric. J., 1957, **40**: 159-87, bibl. 8, illus.
Varieties, cultivation, flowering-control, harvesting, pests and diseases.

q D'ESCAYRAC, F., TISSEAU, M. A., AND TRUPIN, F.
Mécanisation pour la préparation du terrain des cultures fruitières tropicales. **(Mechanisation for preparing land for tropical fruit growing.)**
Fruits d'Outre Mer, 1957, **12**: 387-90, illus.
Three notes on preparing land for bananas and pineapples and on grubbing old pineapples.

r FERNÁNDEZ DE ULLIVARRI, R.
Aprovechamiento de la maloja de la caña de azúcar. **(The utilization of sugar cane trash.)**
Circ. Estac. exp. agríc. Tucumán **154**, 1957, pp. 9.
For mulching and incorporation in the soil: advantages discussed.

s Fernández de Ullivarri, R.
Nuevas variedades de caña de azúcar para Tucumán. (**New varieties of sugar cane for Tucumán.**)
Circ. Estac. exp. agríc. Tucumán **153**, 1957, pp. 5.

t Fernández de Ullivarri, R.
Recomendaciones para la zafra azucarera. (**Recommendations for harvesting sugar cane.**)
Circ. Estac. exp. agríc. Tucumán **152**, 1957, pp. 3.
Topping, temporary storage and the need for maturity tests in Argentina.

u Ferrara, A.
Olio di palma, palmisti ed olio di palmisti nel mondo. (**Palm oil, palm kernels and palm-kernel oil—a world survey.**) [English, French and German summaries 6 lines each.]
Olearia, 1957, **11**: 64-76, illus.
Types of oil palm, composition of oils, and production and trade.

v Fiester, D. R.
Revisión de literatura sobre propagación asexual de café por estacas. (**A review of the literature on the asexual propagation of coffee by cuttings.**)
Turrialba, 1957, **7**: 57-64, bibl. 35, illus.

w de Figueiredo, E. R., Jr.
O contrôle do caruncho das tulhas. (**Control of coffee basket worm.**)
Biológico, 1957, **23**: 197-200, illus.
Fumigation of stored coffee with methyl bromide for control of *Araecerus fasciculatus.*

x Foster-Barham, C. B.
Soil conditions in the tea nursery.
Pamphl. Tea Res. Inst. E. Afr. **13**, 1957, pp. 40-7.
Recommendations on nursery sites and practices.

y G[lover], P. M.
A note on spraying technique against blister blight.
Ser. Tea Res. Inst. Tocklai **62/1** (**cont.**), 1957, pp. 3.
An appendix to *Ser.* 62/1 covering equipment and spray gang organization.

z G[lover], P. M.
Vegetative propagation.
Ser. Tea Res. Inst. Tocklai **117**, 1957, pp. 3.
Advantages and uses of clonal tea discussed.

1998.

a G[lover], P. M., and D[utta], S. K.
Infilling and treatment of infills.
Ser. Tea Res. Inst. Tocklai **43/2**, 1957, pp. 3.
Dealing with gaps in established tea.

b G[lover], P. M., and D[utta], S. K.
Medium pruning.
Ser. Tea Res. Inst. Tocklai **53/2**, 1957, pp. 4.
Height, time of year, method and subsequent treatment.

c Govindarao, P., Reddy, G. S., and Subbaiah, J.
A new disease of the coconuts in the Andhra state.
Indian Coconut J., 1956, **9**: 215-21, bibl. 5, illus.
Tapering, crown reduction and death; cause unknown.

d Inter-American Institute of Agricultural Sciences.
The propagation of cacao.
Cacao, 1957, **3**(12): 3-7.
A review with emphasis on work comparing clones with seedlings.

e Kawai, S., Ishigaki, K., and Ikegaya, K.
Relation between the degree of calcium, potassium and magnesium saturation of the soil and the growth of the tea plant. (Part 1.) [Japanese, with English summary ⅙ p.]
Study of Tea, Tôkai-Kinki agric. Exp. Stat., Tea Div., 1957, No. 17, pp. 41-7, bibl. 20, illus.
The first paper in this series gives soil data only.

f Khanna, K. L., Sharma, S. L., and Srivastava, R. C.
Outstanding canes of Bihar. II.—B.O.10: a combination of high resistance to red rot, yield and sucrose.
Indian J. Sugarcane Res., 1957, **1**: 202-9, bibl. 6, illus.
Detailed morphological description, liberally illustrated.

g Lakshmikantham, M.
Pouch piercer—an aid to rapid maturity survey of sugarcane fields with hand refractometer.
Indian J. Sugarcane Res., 1957, **1**: 231-4, bibl. 3, illus.
Instrument described and illustrated.

h Lescano Alva, M.
Empleo de clones productores-resistentes de jebe en el establecimiento de plantaciones. (**Use of disease-resistant high-yielding hevea clones for establishing plantations.**)
Bol. trim. Exp. agropec. P.C.E.A. Lima, 1957, **6**: 11-12.
More satisfactory than the double-worked trees now generally used in Peru.

i Liefstingh, G.
Resultaten enquête teruglopende rubberprodukties. (**Results of a survey of declining yields in rubber.**) [Indonesian and English summaries 14 and 12 lines.]
Bergcultures, 1957, **26**: 455-63, bibl. 6, illus.
Factors contributing to recent declines in Indonesian yields are discussed.

j McMartin, A.
The growth and development of the sugarcane plant.
Bull. S. Afr. Sugar Ass. Exp. Stat. **5**, printed in *S. Afr. Sugar J.*, 1957, **41**: 1001-9, illus.
Describes in detail the germination, tillering and growth of a stool of sugar cane.

k Marteau, V. G.
Influencia del despuntado de la caña en los rendimientos fabriles de la industria azucarera tucumana. **(Effect of topping of sugar cane on factory output in the Tucumán sugar industry.)**
Rev. industr. agríc. Tucumán, 1957, **41**: 15-26.
Sugar recoveries from carefully topped and inadequately topped cane compared.

l Matthysse, J. G.
Research on insecticidal control of Philippine crop pests.
J. econ. Ent., 1957, **50**: 517-18.
A brief summary relating to pests of fruit, vegetables, cacao, sugar cane and manila hemp.

m Mazery, G.
Preliminary notes on overhead irrigation of sugarcane in Mauritius.
Rev. agric. sucr. Maurice, 1957, **36**: 231-40, bibl. 12.
Assessing water needs and installing equipment.

n Mejia J., M.
20 años de la Federación Nacional de Cafeteros de Colombia, 1937–1957. **(20 years of the National Federation of Coffee Growers of Colombia, 1937-1957.)**
Publ. Fed. nac. Cafet. Colomb., Bogotá, 1957, pp. 177, illus.
Progress in production, storage, transport and trade reviewed.

o Meyer, T.
Revisión de las Sapotáceas argentinas. **(Revision of the Sapotaceae of Argentina.)** [English summary 9 lines.]
Rev. agron. Noroeste argent., 1957, **2**: 261-94, bibl. 34, illus.
Including edible-fruited species of *Chrysophyllum*, *Bumelia* and *Pouteria*.

p Miller, C. D., and Branthoover, B.
Nutritive values of some Hawaii foods.
Circ. Hawaii agric. Exp. Stat. **52**, 1957, pp. 20, bibl. 22.
Tabulated data; fruits and vegetables being prominent.

q Money, R. W., and others.
Analytical data on some common fruits.
J. Sci. Food Agric., 1958, **9**: 18-20, bibl. 2.
Tabulated data for bananas, citrus, melons and pineapples, and pH values for these and temperate fruits.

r Muthuswamy, R., and Aravamudhan, P.
Germination studies on stored canes treated with and without Aretan.
Indian Sugar, 1957, **7**: 402-5, bibl. 3.
Aretan treatment improved germination of stored and fresh setts.

s Narasimham, R. L.
Fibre in sugarcane. I.—A review.
Indian J. Sugarcane Res., 1957, **2**: 31-5, bibl. 26.

t (Narayanan, B. T.)
Brown-eye-spot disease.
Indian Coffee, 1957, **21**: 281-2, 292, illus.
Suggestions on control of *Cercospora coffeicola*.

u Nirula, K. K.
Investigations on the pests of coconut palm. Part IV. *Rhynchophorus ferrugineus* F.
Indian Coconut J., 1956, **9**: 229-47, illus.
Distribution, description, life history, natural enemies, and economic importance.

v Nirula, K. K., and Menon, K. P. V.
Insect pests of coconut palm in India.
FAO Plant Prot. Bull., 1957, **6**: 1-5, bibl. 17.
A review of major and minor pests and their control.

w Nirvan, R. S.
Malformations in mango.
A.R. Fruit Res. Stat., Saharanpur, 1950-53, 1957, pp. 66-70, bibl. 12, illus.
Of panicles and leaves; neither organisms nor viruses are involved.

x Paardekooper, E. C.
De aanleg van rubberzaadtuinen. **(The layout of rubber seed gardens.)** [Indonesian and English summaries 24 and 23 lines.]
Bergcultures, 1957, **26**: 513-18, bibl. 6.

y Paardekooper, E. C.
De hevea-selektie der C.P.V. in vogelvlucht. **(A survey of hevea selection by the Centrale Proefstations Vereniging.)** [Indonesian and English summaries $\frac{1}{4}$ p. each.]
Bergcultures, 1957, **26**: 505-13, illus.
Some results of selection work are included.

z Pigatti, A., and Giannotti, O.
Determinação biológica do B.H.C. (isômero gama) em sólos de lavouras de café, tratadas com êsse inseticida e sua confirmação por cromatografia em papel. **(Biological determination of BHC (gamma isomer) in treated coffee soils and its confirmation by paper chromatography.)** [English summary $\frac{1}{2}$ p.]
Arq. Inst. biol. S. Paulo, 1956, **23**: 101-7, bibl. 9.
No plant injury observed after 7 years' applications.

1999.

a Pousa Bicudo, L.
Pontos controversos em cafeicultura. **(Controversial points in coffee growing.)**
Bol. Super. Serv. Café, S. Paulo, 1957, **32**(365): 15-18.
Suggestions on spacing, planting depth, number of plants per hole and manuring in São Paulo.

b Price, W. C.
The cadang-cadang disease of coconut.
Araneta J. Agric., 1957, **4**: 19-27.
A general discussion, with reasons for supporting the virus theory.

c Rao, P. R. N., and Chandy, K. C.
Studies on the incidence of sugarcane borers.
Indian J. Sugarcane Res., 1957, **2**: 23-30, bibl. 2.
Chilotraea, *Proceras* and *Scirpophaga* spp. in relation to variety and season.

d Rao, U. N., and Muthuswamy, S.
A note on some promising seedling *Annonas.*
South Indian Hort., 1957, **5**: 62-6, bibl. 5.
Five custard apple selections described.

e Risdon, E. J.
The drying and smoking of natural rubber. Part I.—The design and operation of temporary type smoke-houses.
Quart. Circ. Rubb. Res. Inst. Ceylon, 1957, **33**: 6-34, bibl. 8, illus.
With a series of elevation and ground plans.

f S[armah], K. C.
Branch canker (*Poria hypobrunnea,* Petch) following sun-scorch and branch damage.
Ser. Tea Res. Inst. Tocklai **68/1**, 1957, pp. 3.
Notes on damage and treatment.

g S[armah], K. C., and G[lover], P. M.
Branch die-back and *Nectria.*
Ser. Tea Res. Inst. Tocklai **65/2**, 1957, pp. 4.
Symptoms and curative and preventive measures.

h Sharma, S. L., and Shrivastava, B. B.
Bud mutation in B.O. 11.
Indian J. Sugarcane Res., 1957, **1**: 230-1, bibl. 1, illus.
Colour and size differences in upper and lower internodes.

i Singh, L. B., and Singh, R. N.
Some promising mango selections of Uttar Pradesh which need commercialization.
A.R. Fruit Res. Stat., Saharanpur, 1950–53, 1957, pp. 37-43.
Short descriptions of 16 varieties.

j Singh, U. R.
A note on seed content and germination of guava (*Psidium guajava*) and Kagzi lime (*Citrus aurantifolia* Swingle).
A.R. Fruit Res. Stat., Saharanpur, 1950–53, 1957, pp. 59-62, bibl. 1.
Early sowing of freshly extracted seed desirable.

k Swan, A. D.
The effect of tropical cyclones on the sugar crop in Mauritius.
Rev. agric. sucr. Maurice, 1957, **36**: 241-6.
An analysis of the records of the past 100 years.

l Tabayoyong, F. T.
A review of fertilizer experiments harvested during the 1954-55 and 1955-56 crop years in the Victorias Milling district.
Sugar News, 1957, **33**: 376-9 and 521-6.
Sugar cane yields from 9 NPK mixtures compared, the most profitable being 180–120–180 kg./ha.

m Taysum, D. H.
A possible basis for phyto-immunity.
Nature, 1958, **181**: 174-5, bibl. 2, illus.
Evidence that hevea latex is an agglutinating system.

n Taysum, D. H.
Bacterial culture media from hevea latex.
J. Rubb. Res. Inst. Malaya, 1957, **15**: 19-21, bibl. 2, illus.
Two media from reject materials.

o Taysum, D. H.
Microflora of hevea latex. I. Growth media.
J. Rubb. Res. Inst. Malaya, 1957, **15**: 72-6, bibl. 10, illus.
Modified Kligler's iron agar permits accurate counts of bacteria.

p Toohey, C. L.
A new variety—Q70.
Cane Grs' quart. Bull., 1957, **21**: 52, 57, illus.
Brief description.

q U.S. Department of Agriculture.
Cocoa beans: world production and trade.
Foreign Agric. Circ. U.S. Dep. Agric. **FCB2-57**, 1957, pp. 18.
1957–58 estimate only a fraction above 1956–57 figure.

r U.S. Department of Agriculture.
World sugar production continues to climb.
Foreign Agric. Circ. U.S. Dep. Agric. **FS4-57**, 1957, pp. 6.
To an estimated 47·7 m. short tons in 1957-58 compared with 45·5 m. in 1956-57.

s Uttaman, P., and Koyamu, K.
Some new forms of coconuts for Kerala cultivators.
Coconut Bull., 1957, **11**: 257-9, illus.
Performance of 8 imported varieties at Pilicode Res. Stat.

t Vasudevan, C. K., and Rao, S. A. R.
Control of green bug in coffee.
Indian Coffee, 1957, **21**: 371-4, bibl. 4.
With 0·015% Folidol E 605, 0·1% Ekatox and 0·125% HETP.

u Watson, G. A.
Cover plants in rubber cultivation.
J. Rubb. Res. Inst. Malaya, 1957, **15**: 1-18, bibl. 75.
A review.

v W[ight], W.
Seasonal distribution of yield in Assam tea estates.
Ser. Tea Res. Inst. Tocklai **21/1**, 1957, pp. 3.

w Yampolsky, C.
Some aspects of the oil palm in Indonesia.
Econ. Bot., 1957, **11**: 208-24, bibl. 12, illus.
Varieties, their fruit characters and nomenclature.

NOTES ON BOOKS AND REPORTS.

Books.

2000. Davidis, U. X.
Epitrapesiai staphylai. **(Table grapes, (varieties, cultivation, technology.)** [French and English list of contents.]
Hellenic Centre of Productivity, Athens, 1956, 9½×6½ in., pp. 279, bibl. 13, illus.

History, nutritional value, statistics of production in Greece and elsewhere and the characters of 54 table grape varieties are dealt with in the first 88 pages. Cultivation methods and costs are next considered. In part 3 (pp. 149–243) ripening, harvesting, packing, storage and transport are described, and in part 4 marketing channels and marketing methods in Greece are discussed and details are given of production and the export trade.

2001. FAO. (Peebles, T. F., and de Bakker, G.)
Index of agricultural research institutions in Europe. Vols. I and II. [In English, French and Spanish.]
FAO, Rome, 1957, 10½×8 in., pp. 201 and 205.

These two guides are based on information supplied through official Government channels. Needless to say, though most useful and set out in orderly fashion, the information would not appear to include, shall we say, borderline cases such as research stations on crops the products of which are government monopolies, e.g. tobacco and possibly others. The data given are simple and should be extremely helpful to those wishing to make contacts.

2002. FAO. (Hopfen, H. J.)
International directory of agricultural engineering institutions. [In English, French and Spanish.]
FAO, Rome, 1957, 10½×8 in., pp. 326, $1.00.

Part I provides information on government services and institutes, country by country. Included under this head are research stations, universities and advisory services, the people concerned being named in each case. Part II, which is much shorter, lists national associations of suppliers and gives details of shows and publications. There is a subject index and an index of names.

2003. Free, M.
Plant propagation in pictures.
Museum Press, Lond., 1957, 9×6 in., pp. 249, illus., 32s. 6d.

This is a delightfully friendly book by a mature horticulturist, who, from his first days at Kew some fifty years ago, then in the famous botanic gardens in Cambridge and Edinburgh and in numerous establishments in America, has been engrossed in gardens and the multiplication of their inhabitants. In spite of this professional training the author has clearly earned the right to amateur status and now shares freely his experiences whether successful or not; how comforting it is to find that someone else has difficulty in establishing marcots and cuttings rooted under mist! The title indicates pictures; there are over 350 and all selected to illustrate some special feature of interest or to show us a technique of value. These pictures are supported and extended by excellent captions, and there are pages of text here and there serving each section. Pretty well all aspects of propagation are featured, seed and spores, natural vegetative multiplication, and cuttings and layers of many kinds. The uses of synthetic hormones for cuttings and marcots, polythene film, fluorescent lighting in the cellar, and mist apparatus in the open, are described with an eye to the garden. There are valuable hints on the use of household materials as substitutes for costly apparatus. Amateur gardeners will not only learn a lot fron this book but will do so easily and will be charmed by the author's delightful, "at your elbow" style; he seems indeed to be with us in person walking around, across and through the garden, a most pleasant change from the many journeys we have had to take in procession up the garden path. R.J.G.

2004. Gangolly, S. R., Singh, R., Katyal, S. L., and Singh, D.
The mango.
Indian Council of Agricultural Research, New Delhi, 1957, 10×7½ in., pp. xiii+530, bibl. 162, illus., $12 or 85s.

This exceptionally well produced and authoritative book results from studies sponsored in 1948 by the Indian Council of Agricultural Research. Its subject is India's foremost fruit and one of the great crops of the world. Once again one is struck by the almost fabulous nature of the mango—a tree that is as much a feature of India's culture and folk lore as it is of India's countryside. Its economic importance is vast, occupying as it does some 1½ million acres in India alone and growing over a remarkable range of climatic conditions. And to many other countries throughout the tropics its present and potential importance is as great.

Yet the total of scientific knowledge about the mango is far from commensurate. Perhaps the few workers in tropical countries have had more pressing tasks or have been overwhelmed by the confusing multiplicity of varieties and of vernacular names and synonyms. In this respect this volume makes immediate appeal. Of the 1,400 or so Indian varieties, only 210 have been selected and described, so that one recognizes a wholesome and welcome restraint. And of these only a few are fully commended for quality; indeed only 26 or so are rated as "very good" and only 6 better still.

The book first provides a useful section on the botany of the tree—a brief hors d'oeuvre before the main dish which consists of 210 page-length descriptions of the varieties each accompanied by a superb coloured photograph of the fruit—but not, alas, including the leaves and blossoms. These photographs are the outstanding feature of the book. The descriptions are clear and adequate and such technical terms as are used are clearly defined and illustrated in the preliminary pages. There is no attempt to provide an artificial key.

The closing sections concern the cultivation of the tree and its pests and diseases. There is little of substance to record and there is clearly a great need for more scientific work on the mango. This book will greatly assist future workers by providing a clear statement of what is already known, and, since selection and breeding are the major tasks ahead, by guiding workers through the labyrinth of so-called varieties. It can be confidently recommended to all who are interested in tropical horticulture and equally to those who live in India and wish to enjoy a closer gustatory knowledge of the best of tropical fruits. G.E.T.

2005. HUDSON, J. P. (EDITOR).
Control of the plant environment, being *Proc. 4th Easter School in agric. Sci., Univ. Nott., 1957.*
Butterworths Scientific Publications, London, and Academic Press Inc., New York, 1957, 8½×5½ in., pp. 240, bibls, illus., 42s. or $7.50.

In accordance with its policy of providing a forum for the discussion of subjects of contemporary interest, the 1957 Easter School at Sutton Bonington (Nottingham) centred around how to grow plants under more uniform experimental conditions. The Proceedings are divided into 4 sections: I. Effects of the environment on plants (7 papers, 107 pp.). II. The control of environmental factors for plant experimental work (3 papers, 43 pp.). III. Installations for the control of plant environments (19 papers and notes, 40 pp.). IV. Demonstrations (24 items, 18 pp.). To these are added a list of members and author, plant and general indices.

Anyone wanting to set up a phytotron or humble cabinet or even a plant cover will find material of interest in the second half of the book. In part II the papers by J. P. Hudson and W. J. C. Lawrence exhibit their expected sound common sense, and one by L. G. Morris of the N.I.A.E. treats the design of growth rooms from a refreshingly fundamental standpoint, while in part III, dealing with particular installations, "you pays your money and you takes your choice". It is interesting to note that cooling water is not satisfactory for keeping down glasshouse temperatures in sunshine and that forced ventilation is now preferred. As might be expected, the account of the demonstrations includes many useful tips and gadgets. The more erudite opening section contains a most interesting and relevant resumé by E. C. Wassink of the results obtained by the Laboratory of Plant Physiological Research at Wageningen. Collectors and pessimists may care to note "photomorphogenesis" on p. 77.

D.H.M.

2006. HUMPHREY, N.
A review of agriculture and forestry in the island of St. Helena.
The Crown Agents for Oversea Governments and Administrations, London, on behalf of the Government of St. Helena, 1957, pp. 88, map, 15s.

This is a useful interim report in the long story of the rehabilitation of the derelict economy and agriculture of this island. The loss of forest cover, mainly through the ravages of goats, consequent erosion, the diversion of shipping after the opening of the Suez Canal, and a one-crop economy (New Zealand hemp) all spelt disaster. This review describes re-afforestation, pasture improvement, soil conservation and attempts at crop diversification. Hopeful crops include coffee, lily bulbs and possibly citrus and other fruits.

2007. HUNT, K. E.
Colonial agriculture statistics. The organisation of field work.
Colon. Res. Publ. **22**, 1957, 13×8 in., pp. 123, H.M.S.O., 14s.

This publication is a revised version of "Statistics for Colonial Agriculture", 1951. Part I deals with the various types of enquiry made in the collection of agricultural statistics, including land use surveys, crop area and production estimation, crop forecasting and perennial and mixed crops production. Part II describes the administrative work essential to the collection of agricultural statistics, such as the selection and training of staff, and Part III provides most valuable appendices on practical matters, such as the form of schedules and questionnaires, measuring and mapping equipment, and check lists for planning and equipping statistical surveys. A subject index is provided.

2008. INTERNATIONAL POTASH INSTITUTE.
Potassium symposium 1956.
International Potash Institute, Bern, [undated], 9×6 in., pp. 274, bibls, illus. S. Fr. 16.

This symposium comprises the 11 papers read at the 3rd congress organized by the Institute and held in London in 1956. The papers are in English, French and German, each with summaries in these 3 languages and in Spanish. The theme of the symposium is the relationship between potassium and the plant. Aspects reviewed include K and cellular biology, K and physiological processes and the effects of K under field conditions.

2009. METCALF, R. L. (EDITOR).
Advances in pest control research, Volume I.
Interscience Publishers, New York and London, 1957, 9×6 in., pp. 514, bibls, $11.00.

This very valuable book is the first of a projected series, of which the editor says: "The subject matter will be selected from recent significant research trends related to all phases of pest control, with emphasis on the fundamental aspects. As in other "Advances", the writers will be specialists in the various fields, who will be urged to contribute not only comprehensive reviews but also critical evaluations of new concepts and developments. It is hoped that, by the encouragement of the presentation of personal viewpoints, "Advances in Pest Control Research" will become a stimulating vehicle for the fostering of new lines of research as well as a continuing reference work for the research worker, the teacher and the student. Advice and counsel leading to the best approaches to these objectives are earnestly solicited."

In this volume ten topics are dealt with at varying length from 26 pages for "Mechanisms of fungitoxicity" (J. G. Horsfall) to 94 pages for "Chemical analysis of pesticide residues" (M. S. Schechter and I. Hornstein). As we have come to expect, J. M. Barnes gives a very balanced view of "Control of health hazards associated with the use of pesticides" (38 pages). Other authoritative articles cover "Chemistry and mode of action of herbicides" (A. S. Crafts, 41 pages), "Recent advances in control of soil fungi" (J. B. Kendrick, Jr., and G. A. Zentmyer, 56 pages), "Repellents for biting arthropods" (G. F. Shambaugh, R. F. Brown and J. J. Pratt, Jr., 27 pages), "Bioassay of pesticide residues" (Yun-Pei Sun, 48 pages), "Uses of radioisotopes in pesticide research" (P. A. Dahm, 66 pages), "Chemistry and action of organic phosphorus insecticides" (T. R. Fukuto, 46 pages), and "The status of systemic insecticides in pest control practices" (W. E. Ripper, 48 pages). The last three articles all deal with organophosphorus compounds and to some extent overlap, but, in view of the strides made in this field, this is not a fault.

No errors or misprints were detected in some articles, but other articles, notably those by Horsfall and by Ripper, would have benefited from better proofreading and even editing. Thus, in Ripper's article, the quantity of solvent given as "4 ml." on p. 325, should be 4 lb.; Grob is misquoted on p. 317, and Henderson and Tilton on p. 331. It is worth mentioning that, in the formula for OS-2046 on p. 178, *all* the alkyl groups should be methyl. The use of the abbreviation MCP (pages 42 and 43) for 2-methyl-4-chlorophenoxyacetic acid (MCPA) is not satisfactory, as the propionic acid (MCPP) analogue is also in current use. The format, paper and typography are all up to the usual high standard for this publisher, and the 18-page subject index seems adequate. The price, while high by British standards, is comparable to those of similar books recently published in the U.S.A. A.H.M.K.

2010. Morettini, A., Breviglieri, N., Baldini,
E., and Scaramuzzi, F. (Editors).
La coltura del pero in Italia. **(Pear growing in Italy.)**
Riv. Ortoflorofruttic. ital., 1957, Vol. **41**,
Special Number, pp. 474, illus., L. 3,000.

This formidable compilation by the leaders of horticultural progress in northern Italy will be most acceptable far beyond the confines of that country. The illustrations, all in black and white except for two which show in colour Morettini's hybrids Williams × Coscia 29, namely Santa Maria, and Williams × Coscia 59/IV, viz. Butirra Precoce Morettini, show clearly the points for varieties discussed. Two short sections of particular importance to Italians are followed by careful discussions on the following subjects of general interest to all pear growers: *Pyrus* species of cultural value, by R. Carlone; Genetic improvement of the pear, by A. Morettini; Flower and fruit biology, by N. Breviglieri; Propagation, by F. Scaramuzzi; Rules for establishing a commercial pear orchard, by A. Morettini; Soil management, including manuring and irrigation, by E. Baldini; Training and pruning, by N. Breviglieri; Diseases and pests and their control, by D. Rui; Spring frost protection, by E. Baldini; Nutritional value, by S. Visco; Marketing, by F. Tradardi; Cold storage, by E. Bottini; Grading and packing, by L. Groja; and Industrial uses, by R. Andreotti.

Finally, there is a particularly valuable section from p. 255 onwards by E. Baldini and F. Scaramuzzi on Pear varieties and a comparative pomological study of varieties introduced to Florence. This section includes detailed descriptions of the characters of individual pear varieties. One hundred and twenty-two page plates show clearly the fruits, leaves, seeds, flower characters and shoots of 61 varieties, many of them cultivated outside Italy. In addition there is a useful list of synonyms. Pomologists in temperate climes will be very grateful to all who have contributed to this book, in particular to their old and young friends Messrs. Morettini, Breviglieri, Baldini and Scaramuzzi. D.A.

2011. Norman, A. G. (Editor).
Advances in agronomy, Volume IX.
Academic Press, New York, 1957, 9 × 6 in.,
pp. 308, bibls, illus., $8.00 or 64s.

This year's volume has selected the agriculture of the Old Cotton Belt of the southern U.S. for special consideration. The only article of direct horticultural interest is "Zinc deficiency and its control" by W. Thorne, which reviews the symptoms of deficiency, the functions of zinc in plants, its availability in soils and its supply in cases of shortage.

2012. Organisation for European Economic
Co-operation.
Marketing of fruit and vegetables in Europe.
O.E.E.C., Paris, 1956, 9½ × 6 in., pp. 327,
maps, 12s., $2.00 or 600 F. fr.

The European Productivity Agency has sponsored this publication, which summarizes and compares data on the technical and economic organization of fruit and vegetable markets in O.E.E.C. countries. It is thought likely that there will be increases in the production and consumption of fruits and vegetables in these countries, and it is considered that in most countries the distribution system is comparatively ill-adapted to meet this situation. Some improvements in packaging, transport and sales methods are noted, but more comprehensive methods are needed for international trade. In summary, these are the standardization of produce and packaging, the creation and co-ordination of a European market information organization, and the development of market research and experiments on the distribution of fruit and vegetables.

2013. Spector, W. S. (Editor).
Handbook of biological data.
W. B. Saunders, Philadelphia and London,
1956, 11 × 8½ in., pp. 584, 52s. 6d.

This handbook, prepared under the direction of the Division of Biology and Agriculture of the U.S. National Research Council, provides tabulated data, graphs, etc., in the fields of plant, animal and medical sciences. The horticultural data include, among other things: the occurrence and characteristics of plant pigments, resins, tannins, essential oils and fibres; the composition of plant tissues, seeds, pollen, etc.; propagation methods; growth rates of plants, plant organs and tissue cultures; information on photosynthesis, metabolism, respiration and transpiration; the characteristics and effects of growth substances, herbicides and pesticides; boron and salt tolerances; and temperature, light and radiation effects.

2014. Steinmetz, E. F.
Materia medica vegetabilis.
Steinmetz, Keizersgracht 714, Amsterdam,
1954, 13½ × 8½ in., 3 volumes, pp. 1-245,
246-479, and (indexes) 114, £5 12s. 6d. or
$15.75.

The labour put into this work must have been enormous. The aim of the author, as stated by him, was to provide practical knowledge of the use of plant drugs in therapy, pharmacy, veterinary practice and technology. Three or four lines of information are given in English [quite beyond reproach], Dutch, German and French on the uses of 1,473 drug plants or parts of drug plants. The type is very clear and the indexes in 5 languages, including Latin, also act as an efficient dictionary of drug plant names in the different languages.

Whether it will induce the modern physician to pay more attention to the potential use of plants which are now gradually vanishing may be doubtful, but it is certain that its interest to the naturalist and botanist must be immense. Note is taken of toxic properties. In serious cases a skull and crossbones establishes the danger, in others a mere note suffices, thus of saffron [Flores croci=Stigmata croci *Crocus sativus*] we learn among other things that "large doses cause a feeling of merriment but are poisonous". It is certainly a work to consult from time to time. D.A.

2015. U.S. Department of Agriculture.
Directory of organization and field activities of the Department of Agriculture, 1957.
Agric. Handb. U.S. Dep. Agric. **76**, 1957, pp. 258, Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., price 65c.

The purpose of this comprehensive handbook is made clear in the introduction as follows: "This Directory shows the organizational structure of the Department of Agriculture. The multiple activities of its agencies and offices are explained briefly, and the locations of those activities within and outside the continental United States are given. Only supervisory personnel are listed at each location except for research workers engaged in special projects which makes the latter listing more extensive."

Annuals and reports.

(*See also* 1426, 1666, 1674, 1727, 1730, 1777, 1868, 1898, 1909-1911, 1928-1932, 1960, 1961.)

2016. Bermuda. (Groves, G. R.)
Annual Report of the Director of Agriculture for the year 1956, 1957, pp. 12.

Investigations were begun on the oleander scale and the green shield scale; a general correlation between the Argentine ant and scale infestations was noted and the effect of lizards on the ladybird population was recognized. An outbreak of mediterranean fruit fly occurred on citrus and bait sprays were used for control. Malathion 56% emulsifiable liquid used at rate of 3 pt./100 gal. water gave excellent control of cedar scale. A bait composed of bran 20 lb., DDT (50% w.p.) 1 lb., salt ½ lb., and water 3½ gal. was used successfully against land crabs. CMU at 2½ lb. per acre is recommended as a herbicide for lily fields.

2017. British Columbia.
Fifty-first Annual Report of the Department of Agriculture, British Columbia, 1956, 1957, pp. 126, illus.

Horticultural Branch. Variety trials with grapes and asparagus; cultural trials with tomatoes, onions and asparagus; use of seal-oil as a deer repellent; effects of 2,4,5-T on apricots; weed control in orchards with amino-triazole and dalapon; raised beds in glasshouses for disease control; glasshouse soil fumigation with vapam.

2018. Carmin, J.
Report of the Independent Biological Laboratories for the period May 1953-April 1956.
Bull. indep. biol. Labs Kefar-malal, 1957, **13**(1): 1-19.

The aim of the laboratories, located at Ramatayim, Israel, is to determine the laws underlying the exact ways in which different environmental factors react upon life phenomena, viz. growth, development, succession of developmental phases, productivity and rate of variability. Their research embraces a study of plant and animal life. They publish a bulletin and occasional papers. Among titles of those in preparation are "Citrus trees, variability", and "A treatise on citrus".

2019. Colonial Pesticides Research Committee.
Tenth Annual Report (1956-57), 1957, pp. 197-218.

Research under review includes the following: copper spraying of bananas and coffee, control of *Pseudotheraptus wayi* on coconuts and of Mediterranean fruit fly, olive leaf spot (*Cycloconium oleaginum*), coffee miners and stem borer, hibiscus scale insects, cacao black-pod disease and grapefruit melanose, and numerous insecticidal studies unrelated to particular crops.

2020. Colonial Pesticides Research Unit.
Interim Report year 1957-58, being ***Progress Report No. 21,*** Arusha, Tanganyika, pp. 15.

Studies reported briefly include: the persistence of DDT, dieldrin and endrin on coffee leaves, the treatment of bean seeds with dieldrin against the fly *Agromyza* (*Melanagromyza*) *phaseoli*, the effects of antibiotics on the germination of dwarf bean seeds, the use of 2,4,5-T and 2,4-D to destroy trees and bush regrowth in sisal, and investigations on the resistance of pyrethrum plants to herbicides.

2021. Colonial Products Council.
Fourth Annual Report (1956-1957), 1957, pp. 219-44.

Among the products on which work has been carried out are: castor seed, coconut oil (extraction from the fresh nut), melon seed, mangoes, macadamia nuts, coffee (robusta for soluble coffee preparations), tobacco, pyrethrum, West Indian cherry (*Malpighia punicifolia*) as a source of vitamin C, "corn vegetal" fibre from *Chamaerops humilis*, ramie fibre, coir, *Leptospermum citratum* oil, *Cinnamomum pedatinerrium* bark oil, patchouli, illipe butter (*Shorea* spp.); croton oil, sugar cane and sisal waxes, tomato paste, pineapples, derris, abaca and *Urena* fibres, cacao (curing studies), plant polyphenols, sugar cane (numerous projects), limonin from grapefruit seeds, products from *Dichapetalum toxicarium* and *Anona senegalensis*.

2022. Committee for Colonial Agricultural, Animal Health and Forestry Research.
Twelfth Annual Report 1956-1957, 1957, pp. 19-129.

The vast field of research undertaken in the Colonies is considered under the following main headings: Regional Research; Projects undertaken with assistance from Colonial Development and Welfare funds (including work on cacao, oil palms, bananas, sugar cane and regional floras); and Research carried out by territorial Departments, which, in addition to the above crops, has been concerned with coffee, coconuts, olives, citrus, tea, tung, sisal, cloves, castor, pineapples, carobs, safflower, and various fibres. This report briefly outlines the current progress of numerous investigations on these and other crops.

2023. Cyprus, Department of Agriculture. (Loizides, P. A.)
Annual Report for 1956, Annexure VIII, Annual Report of the Chemistry and Soils Section for 1956, 1957, pp. 10.

Olives: N increased yield but P and goat manure were both ineffective. *Apples:* frequent irrigation in a pot experiment caused chlorosis, which, in the early stages, was more marked in the presence of goat manure and, later, became less marked where ammonium sulphate was applied.

2024. Directie van de Landbouw, The Hague.
Tuinbouwgids, 1958. **(Horticultural guide for the Netherlands, 1958.)**
The Hague, Netherlands, 1958, 9×6 in., pp. 752, illus., fl. 7.

The basic form of this exhaustive reference book changes little from one edition to another, in general only minor improvements being made. Most of the articles in the cultural sections, however, concern aspects that were not covered in the previous year. It is characteristic of modern trends that the sections on pest and disease control and control materials occupy almost 200 pages. In the flower section there is an illustrated, descriptive article on glasshouse fern varieties.

2025. Engholm, B. C. (Chairman), and others.
Report of the Committee on Transactions in Seeds, H.M.S.O., London, 1957, pp. 128, 5s.

The committee was appointed in July, 1954, "to examine and advise on the working of the Seeds Act, 1920, and the contractual relationship between the buyers and sellers of seeds, with particular reference to proposed measures of qualitative control and the giving or excluding of a warranty of the particulars required to be given on sale". This report covers all these matters, except the question of protecting the rights of plant breeders, which is to be reported on later. The chapter headings are: the present seeds act and regulations; principles, aims and extent of seed regulation; analytical purity; germination; seed health; variety, type and authenticity; administration and enforcement; warranty of seeds; packeted vegetable seeds; forest tree seeds; grass seeds used for amenity purposes; flower seeds; seed potatoes; and conclusions.

2026. Fiji.
Annual Report of the Fiji Department of Agriculture for the year 1956, Suva, 1957, pp. 20, price 2s.

The extensive campaign against the rhinoceros beetle (*Oryctes rhinoceros*) was continued, and a small colony of *Scolia oryctophaga* wasps was introduced from Madagascar. Against the rose beetle (*Adoretus versutus*), which attacks young cacao and various ornamentals, there are indications that soil treatment with dieldrin or the erection of barriers around young plants may give good control. A zinc-based spray has shown promise for controlling banana leaf spot. The control of citrus canker by eradicating infected trees has been speeded up by using herbicides to kill the trees, but it is becoming doubtful whether eradication will effectively prevent reinfection.

2027. Friesdorf. (Möhring, H. K.)
XXVIII. Tätigkeitsbericht 1956 der Gärtnerischen Versuchsanstalt zu Friesdorf/Bad Godesberg. **(28th Annual Report of the Horticultural Experiment Station at Friesdorf/Bad Godesberg for 1956)**, pp. 46.

About two-thirds of the report are taken up with accounts of variety trials on hydrangeas, gladioli, chrysanthemums [see abstract 1695], lilies and hellebores. Small items discussed in 3 other sections concern: glasshouse heating, tests of two new plastic materials as glass substitutes, the economics of strawberry forcing, a comparison between peat and a proprietary material for covering bulbs in winter, a comparison between proprietary fertilizers for cyclamen and trials of 34 willow species and strains grown for catkins.

2028. Heidelberg.
Jahresbericht der Staatlichen Lehr- und Versuchsanstalt für Gartenbau Heidelberg für das 3. Tätigkeitsjahr 1956. **(3rd Annual Report of the State Horticultural College and Experiment Station, Heidelberg, for 1956)**, 1957, pp. 98 plus 8 plates.

The report covers a wide range of experimental activities including: *Fruit:* Strawberry, black currant, red currant and apple variety trials. *Spraying trials* with fungicides, insecticides and herbicides on vegetables, fruit and ornamentals. *Infra-red and far-red radiation:* For lettuce, infra-red treatment of seeds for 24 hours a day until emergence and thereafter for 10 hours a day during daylight had a beneficial effect; longer periods of irradiation favoured the generative phase. For cucumbers infra-red treatment advanced harvest, and it also showed promise with tomatoes, but not with cauliflowers. With gloxinias far-red light advanced flowering considerably. *Town waste:* Manurial value for vegetables. *Vegetables:* Lettuce: glasshouse ventilation, nutrition, diseases. Variety trials with several vegetables. *Ornamentals:* Variety trials with carnations, hydrangeas and *Primula malacoides.* The control of flower drop in *Begonia elatior* by sprays. Tests on soil mixtures for several flowers, and foliage and soil applications of magnesium sulphate to advance flowering in begonias.

2029. Indonesia.
Verslag over 1956 van de Proefstations der Centrale Proefstations Vereniging. **(Report for 1956 of the Experiment Stations of the Central Union of Experiment Stations)**, 1957, pp. 173 (cyclostyled).

Experimental work on the following crops is summarized: *Rubber:* vegetative propagation; genetical studies; cultural trials, including clone testing, latex stimulation and manuring. *Coffee:* physiological investigations, including phytotoxicity studies and the effect of growth substances on seedlings; genetical studies; pest and disease control; fermentation. *Tea:* propagation by cuttings; pest and disease control; cultural trials, including plucking, pruning, shading and manuring. *Cacao:* chemicals to improve fruit set; genetical studies; cultural trials, including spacing and manuring. *Tobacco:* manuring and variety trials. *General studies:* machines, manures, chemical and mechanical weed control, green manuring and soil studies.

2030. Instituto Nacional de Investigaciones Agronómicas, Madrid.
Memoria de los Trabajos realizados 1955-1956. **(Report on work carried out during 1955-1956.)**, Minist. Agric., Madrid, 1957, pp. 215.

This report includes: (1) Brief notes on various lines of work in progress in viticulture, mentioning bulletins in which results have been published (pp. 26–9). (2) Studies on kok-saghyz and tobacco [abstracted separately]. (3) Work of the Logroño Fruit-growing Station, including studies on fruit set in plums, rootstocks for peaches, and the application of statistical methods to manurial trials (pp. 173–6). (4) Work of the Jaen Olive-growing Station, including rootstock trials now in progress and claimed to be the first attempts at standardization in any olive-growing country (p. 178). (5) Work of the Subtropical Crops Centre, Malaga, on established sugar cane varieties and on tung for possible introduction into Spain (p. 191).

2031. Instituut voor Tuinbouwtechniek, Wageningen.
Jaarboek Tuinbouwtechniek, 1957/1958. **(Yearbook of Horticultural Engineering, 1957/1958.)** Inst. Tuinbouwtech., Wageningen, 1957, pp. 304, illus.

Reports in the yearbook are intended as a survey of the year's progress in horticultural developments, both in the Netherlands and abroad. Subjects covered are glasshouse construction, heating, uses of electricity, tractors and cultivation implements, spraying, irrigation, harvesting, grading and market transport.

2032. Iowa.
Your Division of Agriculture reports, being ***Annual Report of the Division of Agriculture of Iowa State College for 1956-1957,*** pp. 74, illus.

Amongst matters of more general interest in this non-technical report are items concerning the mineral needs of walnuts, cultural practices with grapes, mite control on flowers and apples, variety trials with flowers and fruits, the use of maleic hydrazide to prevent overcrowding of strawberry runners, storage, freezing and packaging studies, cover crops for orchards, and the new apple variety Jonadel.

2033. Jánossy, A. (Editor).
Nemesített növényfajtákkal végzett országos fajtakísérletek eredményei, 1955. **(Results of Hungarian variety trials in 1955.)** [English, Russian and German summaries.] Országos Növényfajtakísérleti Intézet Kiadványa, Budapest, 1957, 9½×7 in., pp. 440, bibls, illus.

Three general papers, on the activities of the Institute for Plant Variety Testing in 1955, on meteorological conditions in 1944–1955, and on methods of variety testing, are followed by reports on individual crops. Those of horticultural interest are: red pepper, 13 varieties tested; bush bean, 36 varieties; tomato, 14 varieties; melon, 9 varieties; and watermelon, 8 varieties. In a further paper the certification of fruit, vine and ornamental plant varieties is discussed.

2034. Jersey.
Annual Report of the States Experimental Station, Howard Davis Farm, Trinity, Jersey, for 1956, 1957, pp. 80.

Experimental results reported include: Encouraging results in controlling weeds in anemones with TVO, BOV, MCPB, 2,4-DB, and PCP. Fewer tomato plants were infected with *Didymella* stem rot in plots sprayed with zineb and maneb than in plots receiving Cu sprays. Annual applications of DD before main-crop tomatoes resulted in excellent growth in nematode infested soil; yield improvements after DD treatment were the result of larger fruits and earlier cropping.

2035. Jordan Ministry of Agriculture. (Goodman, A.)
Annual Reports of the Agricultural Research Service of the Ministry of Agriculture for the years 1955 and 1956, Deir Alla, 1957, pp. 42 and 58.

Vegetables: variety trials of cabbage, cauliflower and tomato. In a tomato fertilizer trial 17 kg./du. superphosphate (42% P_2O_5) have the highest economic yield; P also advanced cropping.

2036. Lausanne. (Gallay, R.)
Stations fédérales d'essais agricoles, Lausanne. Sous-stations en Valais et au Tessin. Domaines à Caudoz (Pully), Changins (Nyon), La Frêtaz (Bullet). Rapport d'activité 1956. **(Annual Report for 1956 of the Swiss Agricultural Research Stations at Lausanne, with sub-stations in Valais and Tessin, and at Pully, Nyon and Bullet.)**
Landw. Jb. Schweiz., 1957, **6**: 607-844, bibls, illus.

Current work on horticultural crops is briefly discussed in part I under the following headings: *Plant improvement:* vine varieties and culture; top fruit breeding, varieties, rootstocks and cultural techniques; vegetable breeding, varieties and culture. *Technology of agricultural produce:* wine quality of new vine varieties. *Inspection:* of seeds and plants for propagation, fertilizers and plant protection materials. *Pests, diseases and weeds:* of apple, peach, tomato and celery; cockchafer, San-José scale and Mediterranean fruit fly control; virus diseases of tobacco, apple, quince and peach; weed control in asparagus, vines and strawberries. Two original articles published in part II have been noted separately.

2037. MAURITIUS.
Annual Report of the Mauritius Department of Agriculture for 1955, 1957, pp. 108, R. 1.25.

Investigations are in progress on sugar cane (diseases and pests), tea, Mauritius hemp, tobacco (use of soil blocks, control of red ants. fertilizer trial) and citrus.

2038. MINISTRY OF AGRICULTURE, NORTHERN IRELAND.
The Research and Experimental Record of the Ministry of Agriculture, Northern Ireland, 1956, Vol. VI, 1957, pp. 233, H.M.S.O., Belfast, 7s. 6d.

Part I consists of separate research papers. *Part II, Reports from research divisions* (pp. 119-93) includes: *Agricultural entomology:* Endrin controlled black-currant gall mite (*Phytoptus ribis*) and other pests. Control of cabbage root fly (*Erioischia brassicae*) by the application of insecticides to the transplanted crop retarded curd formation, but earlier applications had no ill effects. Gamma-BHC was more effective than dieldrin in controlling carrot fly (*Psila rosae*). *Plant pathology:* High levels of N and P and low levels of K appear to be associated with less severe attacks of *Plasmodiophora brassicae*. Captan effectively controlled black spot (*Actinonema rosae*) of roses, but spraying should be commenced before the disease appears and repeated at fortnightly rather than 3-weekly intervals. *Part III. Agricultural experiments and demonstrations* (pp. 195-233) includes: *Horticultural Centre, Loughgall:* In a variety trial of brussels sprouts, Sherrard's 25 and 24/54 were best. With strawberries the matted system of growing outyielded the single plant system but produced fewer top grade fruit and needed more cultivation labour; Cambridge Vigour and Rearguard were best in a variety trial; captan failed to control grey mould (*Botrytis cinerea*). In a raspberry spacing and variety trial, Landmark at 4-in. spacing yielded most heavily. In a tomato variety trial, Star was outyielded by Ware Cross and Grower's Pride. Other investigations included an orchard sward trial and chemical weed control experiments in fruit and vegetable crops.

2039. MYSORE DEPARTMENT OF AGRICULTURE.
Mysore Agricultural Calendar and Year Book 1956-57, 1957, pp. 218.

This yearbook includes reports on agriculture in the several administrative districts and on the work of citrus and other research stations, and describes investigations on herbicides, plant protection in general and pest control in mango and sugar cane crops. [See also separate abstracts.]

2040. NEW ZEALAND, DEPARTMENT OF AGRICULTURE.
Annual Report of the Director-General of Agriculture for the year ended 31 March 1957, 1957, pp. 187, 6s. 6d.

The Horticulture Division report covers pp. 40–70 and summarizes production, management, marketing and pest and disease information for top and soft fruits, citrus and other subtropical fruits, wines, hops, tobacco, vegetables and ornamentals. At the Levin Horticultural Research Station cultural trials with small fruits, gladioli and glasshouse tomatoes are reported. The 2-acre trial plot at Kerikeri is used for trials of citrus and subtropical fruit varieties and rootstocks. Compost experiments are being carried out at Avondale Horticultural Trial Area.

2041. NEW ZEALAND, D.S.I.R.
31st Annual Report of the Department of Scientific and Industrial Research, New Zealand, for 1956-57, Wellington, 1957, pp. 84, 3s.

In the Secretary's Report (pp. 11–38) are briefly summarized the results of the year's work, including the following: *Spray residues:* Parathion residues on apples sprayed throughout the season until 4½ to 6 weeks before harvest were less than 0·18 p.p.m. Thiram, ferbam and ziram residues on apples picked 1 week after the last application were within the U.S. tolerance limits. Schradan residues were excessive on crops sprayed for aphid control. Apples could be sprayed with phenyl mercury until the closed calyx stage. *Transpiration:* Studies on mustard showed that the transpiration rate of plants falls at a critical soil moisture content, depending on experimental conditions but usually well before the wilting point is reached. Stomata in salvia leaves closed at a higher moisture content when the surface was wet than when it was dry. *Fruit research:* Over a 6-year period clean cultivation has given substantially better results from Jonathan than grassing down. Diphenylamine dips or wraps controlled scald better on Granny Smith than oiled wraps. Of 4 stocks tested for Japanese plums, Marianna was the best, producing a medium-sized tree that comes into bearing early, carries a heavy crop and is resistant to root rotting under wet conditions. *Tobacco research:* The variety Coker 130 showed some resistance to verticillium wilt. Chloropicrin and methyl bromide have shown promise for spot treatment of verticillium wilt in the field. *Current projects* are also listed under the various branches, which include Crop Research Division, Entomology Division, Fruit Research Station, Hop Research Station, Plant Chemistry Laboratory, Plant Diseases Division, Tobacco Research Station and Cawthron Institute.

2042. NORTH OF SCOTLAND COLLEGE OF AGRICULTURE.
Investigations, research and field trials 1957-8, pp. 127.

Contains brief reports of variety trials with soft fruit, chrysanthemums, tomatoes and carrots. The most effective control of carrot fly was from gamma-BHC seed dressing plus dieldrin spray.

2043. PLACHY, E. (EDITOR).
Jahrbuch 1955/1956. Deutsche Akademie der Landwirtschaftswissenschaften zu Berlin. **(Yearbook 1955/56 of the German Academy of Agricultural Sciences in Berlin.)** [List of contents in Russian and English], 1957, pp. 555, bibls.

The yearbook includes reports of 35 research institutes in Eastern Germany, some of which have horticultural departments. Three institutes—those of Grossbeeren, Dresden-Pillnitz and Marquardt—are devoted exclusively to horticulture.

2044. QUEBEC.
Rapport du Ministre de l'Agriculture de la Province de Québec pour l'année finissant le 31 mars 1957. **(Report of the Minister of Agriculture of the Province of Quebec for the year ending 31st March 1957)**, 1957, pp. 290.

The reports on the work of the Plant Protection and Horticultural Services include information on fungicide, insecticide and herbicide trials and statistical data on fruit, vegetable and tobacco production, respectively.

2045. QUEENSLAND.
Annual Report of the Department of Agriculture and Stock for the year 1956-57, Brisbane, 1957, pp. 123, illus.

The report includes details of work on: *Pineapples:* nutritional problems, soil stabilization and structure deterioration, control of pineapple top rot (*Phytophthora cinnamomi*). *Bananas:* kerosene injection for sucker removal, ripening methods using ethylene and hormones, fruit preservation, control of leaf spot (*Cercospora musae*). *Apples:* nutritional studies, sod culture to maintain soil structure, gas storage. *Pears:* optimum time of picking and storage. *Stone fruits:* use of DNOC for thinning plums, of 2,4,5-TP to improve the size, appearance and ripening of apricots, and peach storage. *Grapes:* Zn and Mg deficiencies. *Citrus:* new types of mandarin, sod culture, use of 2,3,5-triphenyl tetrazolium chloride to show up fruit damage, EDB for fruit fly control, control of black spot and brown spot. *Papaws:* irrigation studies, fruit preservation by freezing in sugar solution. *Strawberries:* weed control, mulching, fruit preservation. *Avocadoes:* marketing studies. *Passion fruit:* selection for resistance to *Fusarium* disease. *Macadamia nuts, ginger and figs:* processing methods. *Tomatoes:* fruit setting, diseases. *Beans:* rust resistance trials. *Cauliflowers:* varietal trial. *Cucurbits:* the rock-melon Rio Gold was outstanding. *Carrots:* use of pre-germination weedicides. *Tobacco:* nematode control, stem rot, and a study of leaf chloride.

2046. ROSEWARNE (N.A.A.S.).
Second Report of Rosewarne Experimental Horticulture Station and Ellbridge Substation, 1956, Camborne, pp. 83.

Reports on anemones, brassicas, bulbs and other flower crops and on bulb fly control have been abstracted separately. Other items of interest include: *Fruit:* A brief report on variety trials with black and red currants, gooseberries, raspberries and strawberries. *Other vegetables:* Lettuce and tomato variety trials. Time of sowing trials with runner and broad beans. *Protected cropping:* Observations on various methods of growing vegetable and flower crops under Dutch lights and cloches. *Ellbridge Sub-station:* Time of sowing turnips. Cut flower rotations under cloches. Strawberry varieties under cloches. Autumn-fruiting strawberries. Weed control in strawberries. Chrysanthemum varieties. Cabbage root fly control and swede midge control on savoys. *Plant pathology:* Control of anemone downy mildew.

2047. SAHARANPUR. (SINGH, R. L.)
Annual Report Fruit Research Station, Saharanpur, 1950-53, 1957, p. 85, illus.

This is the first report from the Fruit Research Station established by the Uttar Pradesh Government in 1949 to conduct research on fruits for the plains. Certain projects have been financed by the Indian Council of Agricultural Research. In addition to signed papers, abstracted elsewhere, the report discusses current research under the following heads. *Pomology:* Propagation methods for mangoes, citrus, litchis, jackfruit, *Phyllanthus*, *Zizyphus* and *Aegle*. Floral biology and hybridization of mangoes, citrus, guavas and papaws. Cold storage of litchis. Vernalization of pea and cabbage seeds. Effect of growth substances on propagation of plums, guavas, citrus, vines, etc. *Chemistry:* Studies of soil profiles, manurial requirements and fruit crops. Plant products and their utilization. *Entomology:* Pests of mango and ber (*Zizyphus mauritiana*). *Mycology:* Diseases of mango, papaw, citrus and pomegranate. The progress of a scheme for the production of papain on an enhanced scale is also described.

2048. TANGANYIKA AGRICULTURAL CORPORATION.
Report and Accounts for 1955-56, Dar es Salaam, 1957, pp. 107, 10s.

This is the second annual report of the organization which took over the work of the Overseas Food Corporation and has since undertaken additional projects. The report includes accounts of experiments carried out on the Corporation's stations. Among these were fertilizer experiments on flue-cured tobacco carried out in 1954/55 and 1955/56. In both years N applied at 0·3 and 0·4 cwt. per acre produced significantly higher yields than 0·2 cwt. K improved leaf quality, the effect being highly significant in one year. P had no effect on yield or quality.

2049. TRINIDAD AND TOBAGO.
Annual Administration Report of the Department of Agriculture for 1955, 1957, pp. 73, price 75c. (T'dad).

Work reported briefly includes: *Sugar cane* variety trials. *Cacao* propagation, clone and fertilizer trials, and pest and disease control. *Citrus* rootstock and management trials, the use of hormones to check fruit drop and to control epiphytes, and trials on the control of melanose, scab and seedling lime disease. *Banana* leaf spot and moko disease (*Pseudomonas solanacearum*) control, and the control of borers. *Coconut* selection and red ring disease control.

2050. TYSSER, H. F. (EDITOR).
The Fruit Annual 1957-58.
British-Continental Trade Press Ltd., Strand, London, 1958, pp. 598, illus., £1.

This useful directory includes, as usual, world surveys of the fruit trade and its organizations, a list of journals of interest, a fruit shippers' guide and a dictionary of fruit terms in 5 languages. It also contains short articles on citrus growing in Argentina, banana and pineapple production, the trade in dried fruits and edible nuts, and longer articles on processing and canning and on mechanization in fruit growing, processing and packing. You get your money's worth.

2051. WASHINGTON STATE COLLEGE.
Agricultural and Home Economics Research Progress Report No. 6, Entomology, May 1957, pp. 8.

Results of the following work are briefly reported: Aphid transmission of bean virus diseases; rodent control in orchards; cherry fruit fly control; aphid and mite control on stone fruits; cyclamen mite resistance in strawberries; earwig control in vineyards; pest control in cranberries and blueberries; insecticide residue studies; studies on the physiology of insect susceptibility to systemic insecticides; symphylid control.

2052. WASHINGTON STATE COLLEGE.
Agricultural and Home Economics Research Progress Report No. 9, Horticulture, May 1957, pp. 12.

Summarized results are given on the following: Runner bean breeding, varieties, seed rates, fertilizers and weed control; bush bean varieties, fertilizers and weed control; broccoli breeding and fertilizers; cucumber varieties, fertilizers and weed control; pea varieties, fertilizers and foot rot (*Ascochyta pinodella*) control; rhubarb weed control; tomato fruit setting hormones; tree fruit varieties; blueberry varieties; cranberry fertilizers; vine varieties and pruning; raspberry breeding, varieties and weed control; strawberry breeding, varieties and nutrition; control of respiration rate in apples by injection of enzyme inhibitors; atmospheric fluorine injury to peaches; Zn deficiency correction on cherries and peaches; chrysanthemum varieties.

2053. WASHINGTON STATE COLLEGE.
Agricultural and Home Economics Research Progress Report No. 10, Plant Pathology, May 1957, pp. 11.

Notes are included on control of club root and black root of cauliflower, stem rot of beans, black rot of beet, downy mildew of broccoli and lettuce, mint rust, and various diseases of blueberries and cranberries; the effect of high frequency energy on virus inactivation in strawberries; fungicides and bactericides for tree fruits; control of the turf diseases *Marasmius oreades* and *Fusarium nivale*; control of bulb diseases; symptoms and effects of fluoride fumigation on various ornamental and crop plants.

2054. ZANZIBAR.
Annual Report of the Zanzibar Department of Agriculture, 1956, 1957, pp. 33, 2s.

Citrus: Experiments on wither-tip disease (*Gloeosporium limetticola*) are in progress. *Coconuts:* Control of *Pseudotheraptus wayi*, the cause of premature nut-fall, in experimental plots by mist spraying with the 10 DRDK formulation of DDT is proving effective, infestation rate being assessed from damage to fallen flowers and nutlets. A rotary atomizer giving a narrow droplet spectrum around 90 microns is being used. *Coffee:* Deep mulching caused yield increases.

2055. ZANZIBAR.
Supplement to the Annual Report of the Department of Agriculture, 1956. Results of Field Experiments, Crop and Stock Records and other Statistics, 1957, pp. 12, 1s. 6d.

Coffee: Deep mulching increased yield of Liberian coffee by 12·7 and 10·1 cwt./acre fresh berries in successive years. *Derris:* Applications of NPK at planting time did not increase yields. *Limes:* Budded trees out-yielded seedlings, but fertilizer applications did not increase yields.

New periodicals.

2056. MINISTRY OF AGRICULTURE, LONDON.
Experimental Horticulture. [*Exp. Hort.*], 1957, Vol. **1**, No. 1, pp. 58, 3s. 6d.+ postage 4d.

This is the first of a companion service to Experimental Husbandry [see *H.A.*, 27: 1002]. It contains accounts of the experimental work carried out by the horticulturists of the National Agricultural Advisory Service at the fairly recently established Experimental Horticulture Stations and in the counties. In future issues it will record similar new work. It is addressed primarily to the commercial grower and the advisory officer, but it also affords a means whereby the research officer can determine how his research findings can be applied in practice.

The first number contains an introduction by the present Senior Horticultural Advisory Officer, who gives a short, lucid account of the establishment and aims of the 10 Experimental Stations and the 3 Demonstration Stations. This is followed by 9 articles on different experimental or observational projects [abstracted separately]. In conclusion summaries are given of papers published elsewhere by members of the N.A.A.S. engaged on horticultural work. The periodicity of the journal is not stated, but it would appear likely to be occasional.

2057. TEA RESEARCH INSTITUTE OF EAST AFRICA.
Quarterly Circular. [*Quart. Circ. Tea Res. Inst. E. Afr.*], Vol. **1**, No. 1, 1957, pp. 17, free to licensed tea growers in E. Africa, or 5s. per year.

The aim of this stencilled circular is threefold, viz. to give news of the Institute's affairs, to give practical advice based on the latest available information on all aspects of tea planting, and to give abstracts of publications from other areas in so far as they may throw light on local problems. This first number includes articles on withering, eelworms on tea in East Africa, and plucking in relation to tea growth.

Noted.

2058.

a AUSTRALIA.
Thirty-first Annual Report of the Australian Canned Fruits Board for year 1956-57, 1957, pp. 35.

b AUSTRALIA.
Thirty-third Annual Report of the Commonwealth Dried Fruits Control Board for year 1956-57, 1957, pp. 23.

c CALIFORNIA.
Thirty-seventh Annual Report of the State of California Department of Agriculture, period ending December 31, 1956.
Bull. Calif. Dep. Agric., 1957, **46**: 18-208, illus.

d Canada.
Fortieth Annual Report of the National Research Council of Canada 1956-57, 1957, pp. English 58, French 52.

e Clifton, C. E., Raffel, S., and Stanier, R. Y. (Editors).
Annual review of microbiology, Volume 11. Annual Reviews Inc., Palo Alto, California, 1957, 9×6 in., pp. 536, bibls, $7.00 in U.S.A., $7.50 elsewhere.

f Entomological Society of Ontario.
Annual Report of the Entomological Society of Ontario, 1956, 1957, Vol. **87**, pp. 116.
Including contributed papers.

g Federation of Rhodesia and Nyasaland.
Report of the Secretary to the Federal Ministry of Agriculture for the year ended 30th September, 1956, Salisbury, 1957, pp. 167, 10s. 6d.

h Gel'man, N. S., and Zenkevič, G. D. (Compilers).
Biochemistry of plants: Bibliographical index of Russian literature 1738-1952. [Russian.] *Izd. Akad. Nauk S.S.S.R.*, Moscow, 1956, 10½×7 in., pp. 394, 22 roubles (17s. 6d.).

i The Grower and Prepacker.
Grower Guide Annual. First Issue, 1958. Grower and Prepacker, 49 Doughty Street, London, W.C.1, 1958, 11×8½ in., pp. 116, illus.
Issued only to readers of *The Grower and Prepacker*, and marked confidential.

j Institut National pour l'Étude Agronomique du Congo Belge.
Au service de l'agriculture congolaise. **(Serving Congo agriculture.)** I.N.E.A.C., Brussels, 4th edition, 1957, pp. 156, illus.
A comprehensive guidebook covering aims, programme and results.

k Instituut voor Toegepast Biologisch Onderzoek in de Natuur.
Verslag over het jaar 1956. **(Report for 1956 of the Institute for Applied Biological Research in Nature, Arnhem.)** *Meded. Inst. Toegep. biol. Onderz. Nat.* **31**, 1957, pp. 22.

l Istituto di Allevamento Vegetale per la Cerealicoltura, Bologna. (Bonvicini, M.)
Attività sperimentale 1947-1956. **(Experimental work 1947-1956 at the Institute of Plant Breeding for Cereal Production, Bologna)**, 1957, pp. 30, bibl. 20.
Includes variety trials on vegetables, castor beans and hemp.

m Minnesota.
63rd Annual Report Minnesota Agricultural Experiment Station 1955/56, 1957, pp. 52.
Includes a list of projects.

n Nebraska.
70th Annual Report of the Nebraska Agricultural Experiment Station, 1956, 1957, pp. 30.
Projects and publications listed.

o Nigeria.
Annual Report on the Department of Agricultural Research for the year 1955-56, Lagos, 1957, pp. 24, 9d.
Current research includes work on kola and control of cacao diseases and pests.

p Nigeria.
Annual Reports on the Department of Agriculture of the Northern Region of Nigeria, 1953-54 and *1954-55,* Kaduna, 1957, pp. 101 and pp. 125.
Includes results of sugar cane and tobacco variety trials.

q Royal Tropical Institute, Amsterdam.
Zes en Veertigste Jaarverslag Koninklijk Instituut voor de Tropen, Amsterdam, 1956. **(46th Annual Report of the Royal Institute for the Tropics, Amsterdam, 1956)**, 1957, pp. 77.

r Sierra Leone.
Report of the Department of Agriculture for 1955, 1957, pp. 45, 4s. 6d.
Includes mention of work on control of bacterial wilt of tomatoes.

s UNESCO.
Survey of scientific institutions of Egypt. UNESCO, Middle East Science Cooperation Office, 1957, pp. 149.
Including agricultural organizations and their senior staff.

t West of Scotland Agricultural College.
Farm and Experiments, 1957, 1957, pp. 84, maps.
Including tomato studies, fruit, vegetable and chrysanthemum variety trials, and weed control.

u Wisconsin.
What's new in farm science, being *73rd Annual Report, Part I, Wisconsin Agricultural Experiment Station for 1955/56,* Madison, 1957, pp. 112, illus., issued as *Bull.* 526.
Including studies on insecticide taints in fruit and vegetables.